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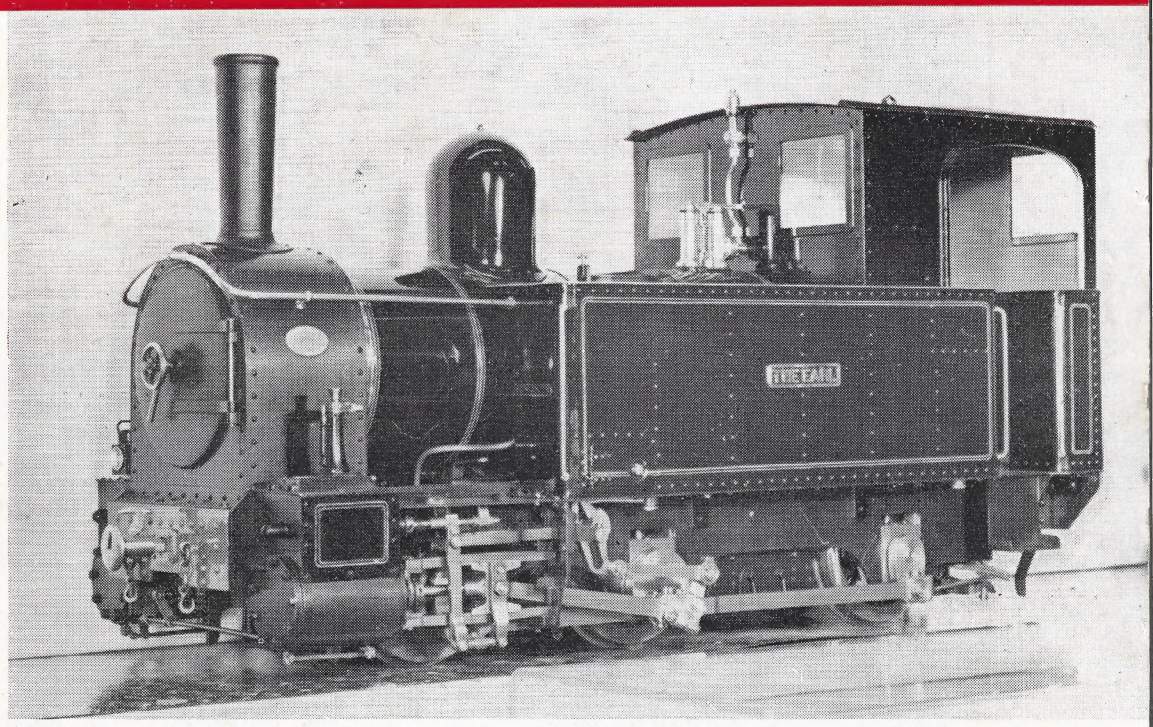

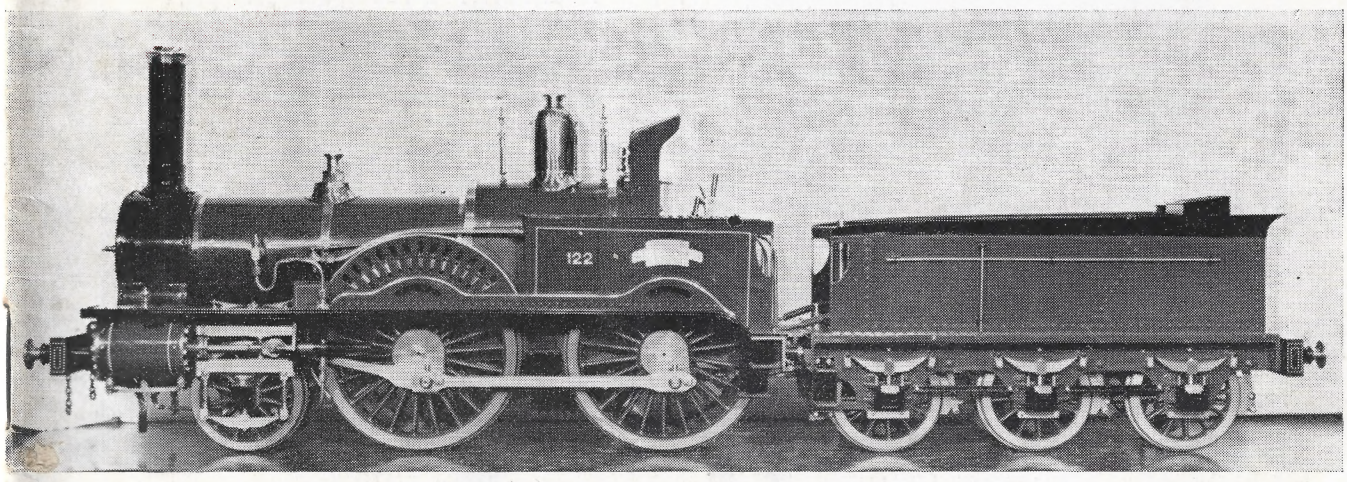

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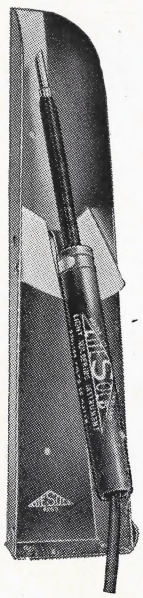

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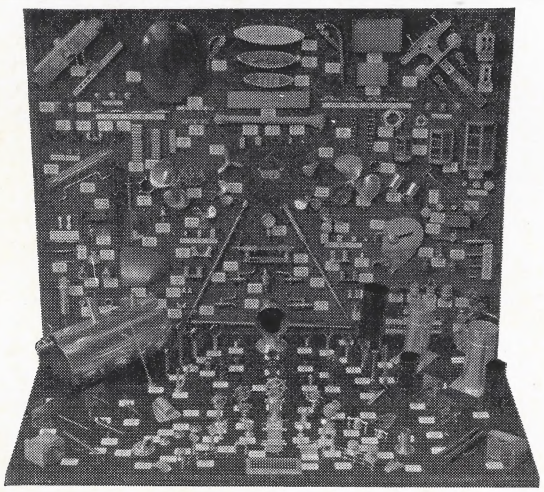

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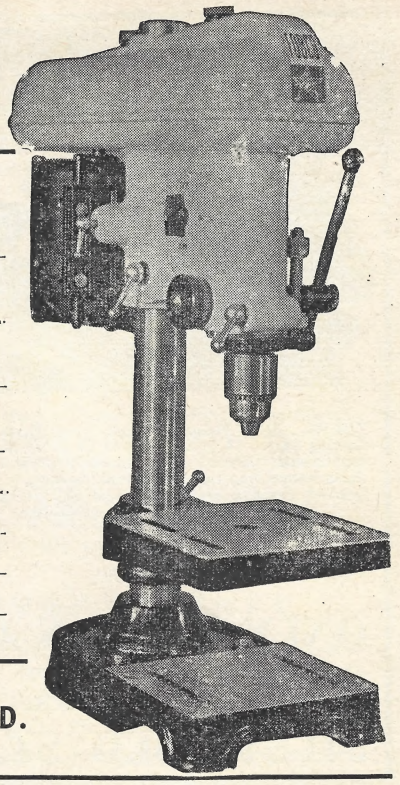

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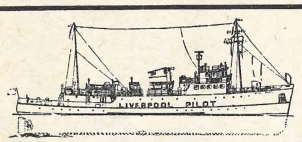

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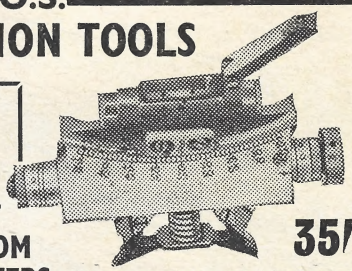

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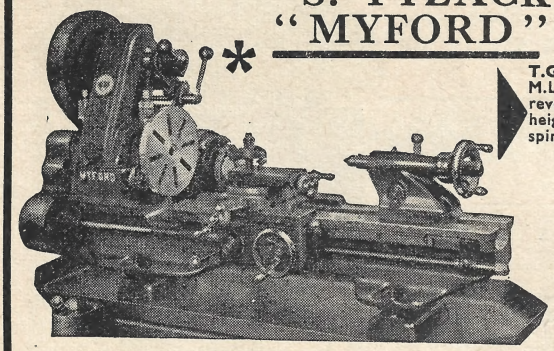

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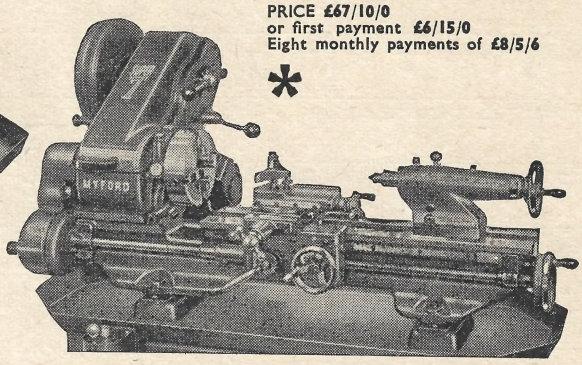

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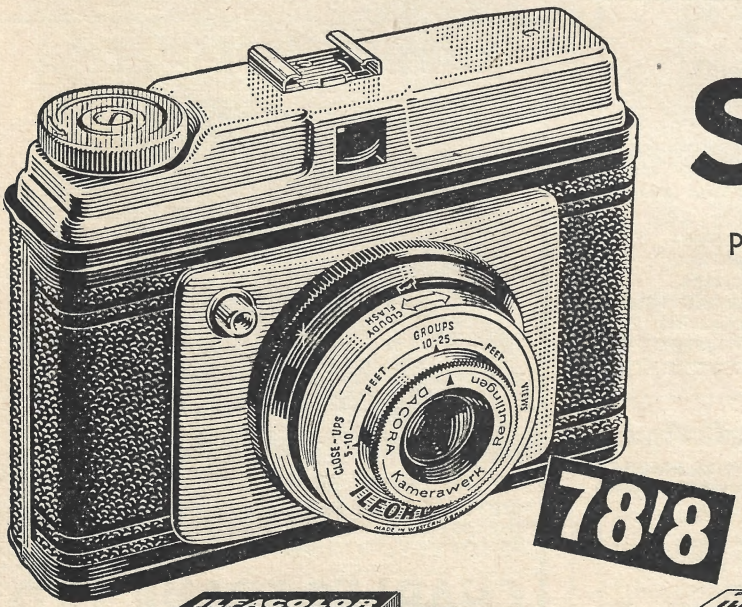

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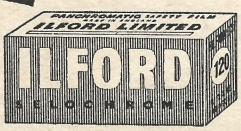

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Model Engineer

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Cover picture

The 1961 *Championship Cup winner,* THE EARL, *an* 0-6-0 3½ *in. gauge tank locomotive entered by Mr J. H. Balleny, and, below it, the silver medallist LSWR* BRITANNIA, *constructed by Mr H. Buckle*

Next week

Further reports of the 1961 *Model Engineer Exhibition will appear in the issue for September* 14. *Raymond F. Stock's series on radio control, held over because of the pressure of Exhibition articles, will be back*

Smoke Rings — A weekly commentary by VULCAN

ALMOST every Model Engineer Exhibition produces a distinctive model. Often it becomes the symbol by which a past show is recalled.

The 1958 Exhibition will always be associated in my mind with Mr A. W. G. Tucker's magnificent 3½ in. gauge Beyer-Garratt which that year shared the Duke of Edinburgh Trophy with Mr E. B. Wilcox's triple expansion marine engine. (How these triple expansions get into the Duke of Edinburgh Competition !)

This year a gleaming little traction in stainless steel aroused my interest, partly because it was displayed right opposite the Percival Marshall stand.

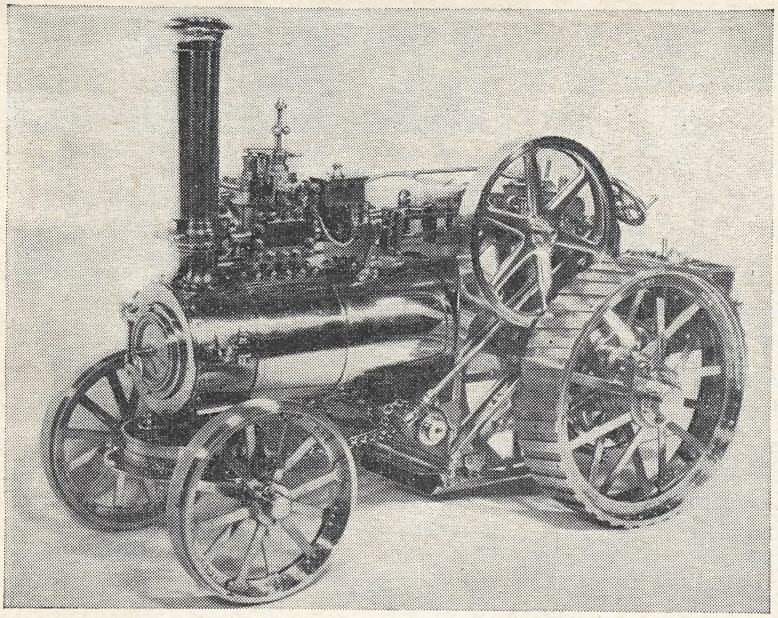
It was entered by Mr J. A. Mackay, of Farnborough, Hants, and is in 1 in. scale to the design by Henry Greenly published in MODEL ENGINEER. It is said to be valued at £400. A Highly Commended diploma was awarded for it.

Doubtless it lost marks by not being in an authentic livery, but to me it represented a spirited departure from tradition. What a gay piece it made,

Enthusiasts probably damned it for not being finished in traditional style. But this, surely, is no criticism of its craftsmanship nor of the modeller's determination to do something different.

The title of many societies represents the members to be "model and experimental engineers." Yet the majority are essentially builders of models; a good deal of experimenting is done, but mostly with specialised lathe accessories. The project, though it may be original in its choice, is usually completed in orthodox fashion.

This is how it should be, for if it were not so there would indeed be a bizarre collection of exhibits at our annual show. Nevertheless, I feel that many are too timid to steer away from the broad channel of convention.



Purists may criticise Mr J. A. Mackay for not finishing his stainless steel traction engine in correct livery, but at least it aroused plenty of interest and lively comment at the Exhibition

A little experiment, providing that it is not ridiculous, is worth the effort. If it succeeds only in arousing a bit of controversy, then it is justified.

Branching out

I WAS surprised as an engine driver hitting the buffer stops to learn that a move is afoot to try to get a branch line reopened.

The line in question is the one which connects Wombourne with Wolverhampton (low level) through a devious route which includes Tettenhall and Dunstall Park—a distance of 10 miles.

The fare for this could be somewhere between 2s. 10d. and 3s. 2d., which compares unfavourably with the buses' 1s. 6d. for a more direct run of five miles.

A meeting was called by the Wombourne Parish Council to discover the wishes of the Parish concerning the proposal to reopen the railway line.

The meeting was told that the line was closed to passenger traffic in 1932 when up to seven trains a day had been operated each way. Now the population had increased considerably and it was thought a train service could supplement the buses.

For the line to be competitive it was suggested that British Railways consider introducing a special fare, and perhaps even collect the fares on the train. The reopening would not involve any expenditure, except on the stations, as the track is kept well maintained for the passage of 11 goods trains per day.

Richard—the second

THE coincidences which befall us at Noel Street are well-known to regular readers of this column. They will not be unduly surprised to hear of yet another.

On April 6, I told how Richard Dimbleby began the career which led to his becoming Britain's premier interviewer. His first assignment was the Model Engineer Exhibition in 1936, as he recalled when he was the interviewed in the " Let's Find Out " on the BBC Light Programme.

Programmes, as we all know, are often repeated. This one was—on the day that Central Hall, Westminster, opened its doors to the 34th Model Engineer Exhibition.

School's need

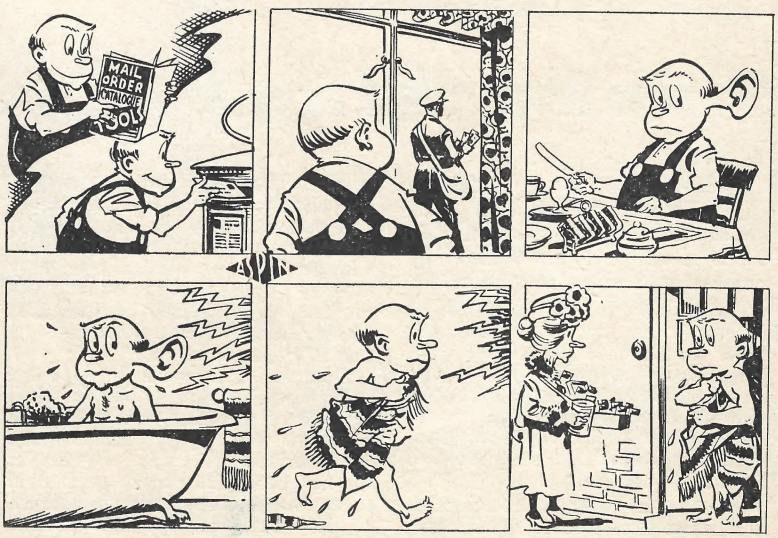
EDUCATION authorities are now realising the value of model engineering in the school workshop. Almost every week we are asked for advice on the selection of equipment, and to suggest suitable projects.

We are, of course, always glad to give what assistance we can and we hope that as many schools as possible will turn to the benefits of model engineering. Many more schools would undoubtedly do so but they are held back for various reasons.

There is, for example, the difficulty which faces Mr T. F. Townley, who has built up a small metalworking section at Baliol School, Sedbergh, Yorks, for boys with special educational difficulties.

Mr Townley would like to equip his workshop with a model engineer's lathe but funds will not run to it. If anyone has an old lathe for which he has no further use, perhaps he would like to negotiate with Mr Townley, at Spellow Cottage, Thorns Lane, Sedbergh, for its disposal.

CHUCK . . . **. . . THE MUDDLE ENGINEER**



SMALL POINTS MATTER

W. J. HUGHES sums up the traction engine models at the Exhibition

IT must be said at once that this year's traction engines were a good crop on the whole, though sundry points of criticism were found by the judges.

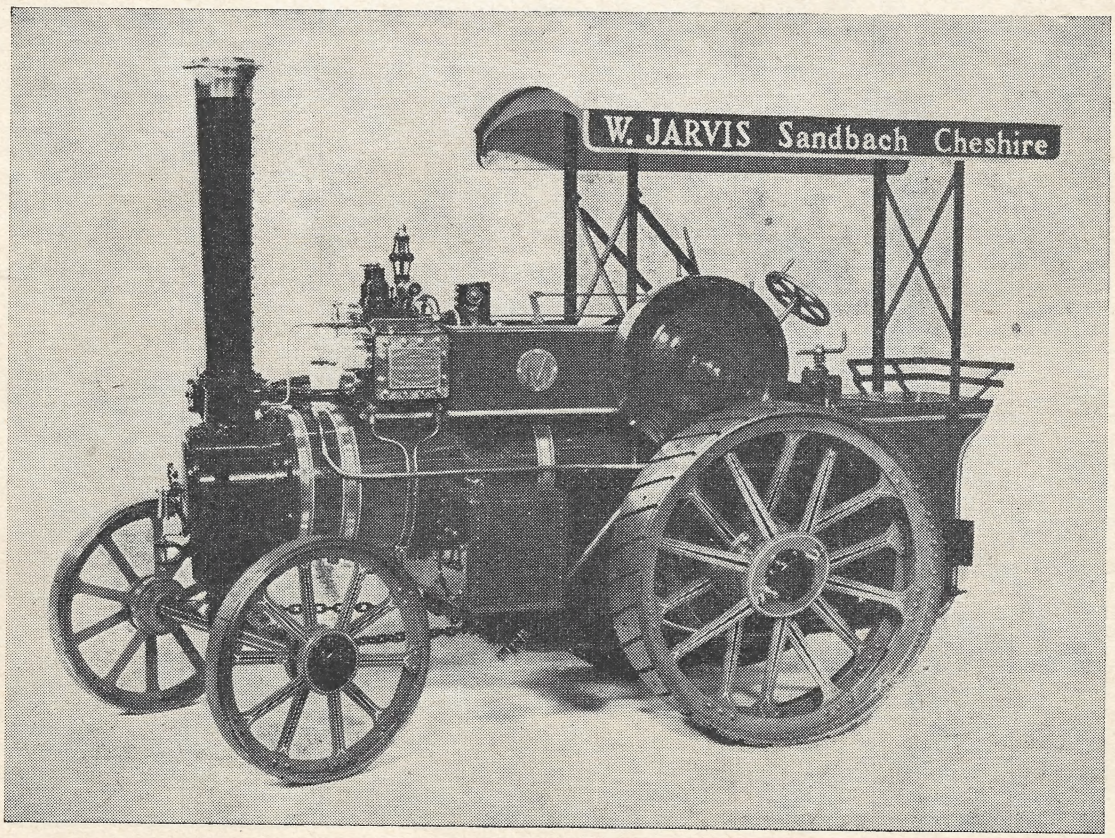
If I appear to dwell rather on the failings than on the good points, I hope that the competitors will take the criticisms in the helpful spirit in which they are offered. Everyone knows from experience (including myself) that adverse criticism of one's work is not pleasant to take, but I am certain that the general rise in the standard of craftsmanship, over the past ten or fifteen years especially, is owing in no small part to the criticisms and advice offered in these pages. After all, the judges have no axe to grind !

Let us begin with the 2 in. scale Marshall tractor sent by W. Jarvis of Sandbach which won the Championship Cup and the Aveling-Barford Trophy. I have already described it fairly fully in MODEL ENGINEER, and those who have read the article will realise that there is little to criticise here.

Since I wrote, the engine has had a canopy added, and has been painted and lined out. The painting and lining had been very carefully done, but the lining was not quite so good as it was on Mr Baigent's Burrell showman's engine, or Mr Rucklidge's Allchin. Marks were lost also because the Pickering governor was a dummy, though a very fully detailed one.

Here I must explain that originally Mr Jarvis had no intention or ex-

Deep in the heart of Cheshire, William Jarvis built a model traction engine which will pull a motor car. It was described in MODEL ENGINEER *of June* 1



pectation of exhibiting the model. (He is a very modest person, and it was I who finally persuaded him to send the model to London.) That is the reason for the dummy governor; he intended to use the engine only for passenger-hauling, and the tick-over could be controlled easily by the regulator and reverse-lever when the engine was running light.

High marks were obtained for general craftsmanship. The motion was smooth and easy but with no looseness; the studs were of even length, with ends well-finished off; the bright parts showed no scratches but were not too highly polished. Fidelity was very good indeed, with such detail as correctly strapped and cottered big ends, correct Marshall safety-valves and check-valve and correct nameplates on the valve-covers.

But where Mr Jarvis scored fairly over other competitors was that, having worked only from a general arrangement drawing and photographs of the original, he had had to work out much of the detail himself.

The dimensions of the valve gear, the interior arrangement of the boiler, the steam passages in the cylinder block, the hind-axle springing—all these things and many more had to be worked out, whereas other competitors had them all ready in the published plans. In these circumstances, Mr Jarvis could score marks for design and originality where the others could not.

Showman's engine

E. M. Baigent's 2 in. scale scenic showman's road locomotive was awarded a well-deserved silver medal. The mechanical finish was very good, and there was no shake in the motion work—indeed, the bearings were quite tight, but this was assumed to be because the engine had not been run in yet.

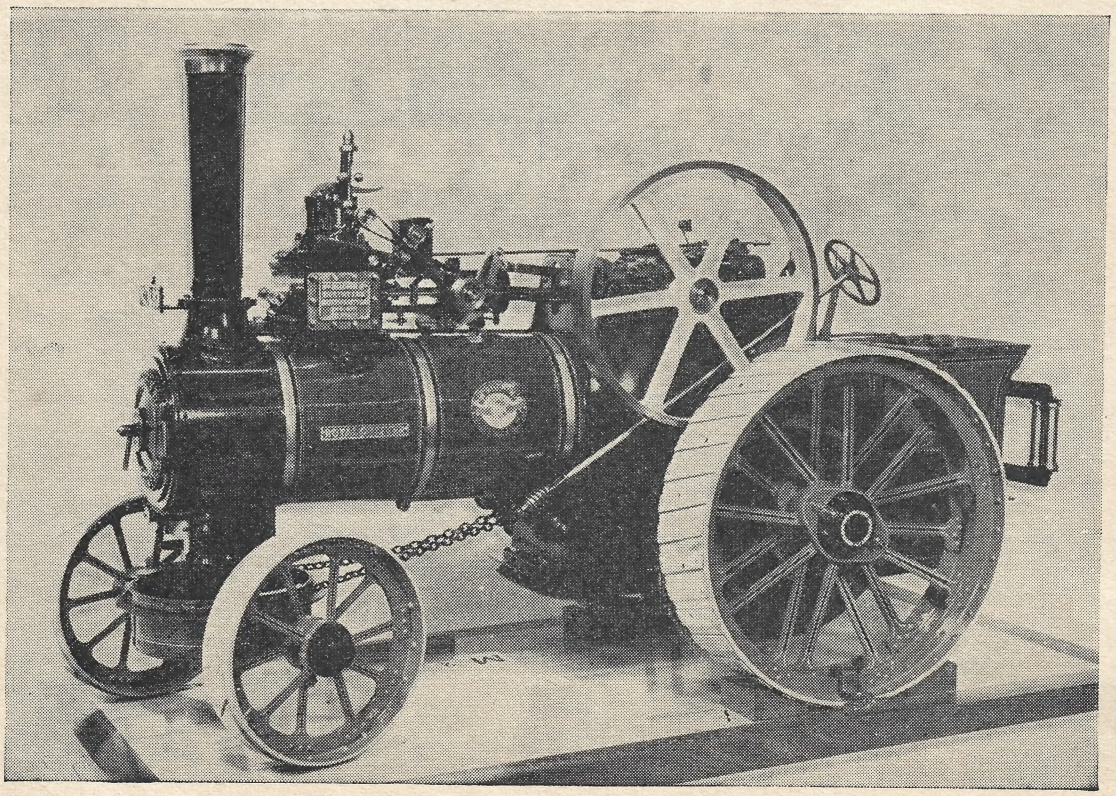
The painting showed signs of brush-marks, and was matt-finish, which is incorrect, of course, though perhaps the builder intends to use varnish later; I hope so ! The lining was very good indeed, but was lacking on the hornplates and gear-covers. This was probably through lack of time; if so, Mr Baigent was wiser to send the engine in unfinished than to rush the job and spoil it, as is so often done. The lettering on the side-boards of the canopy was put on neatly with transfers; it was plain sanserif and a far cry from the ornately serifed and shaded true showman style.

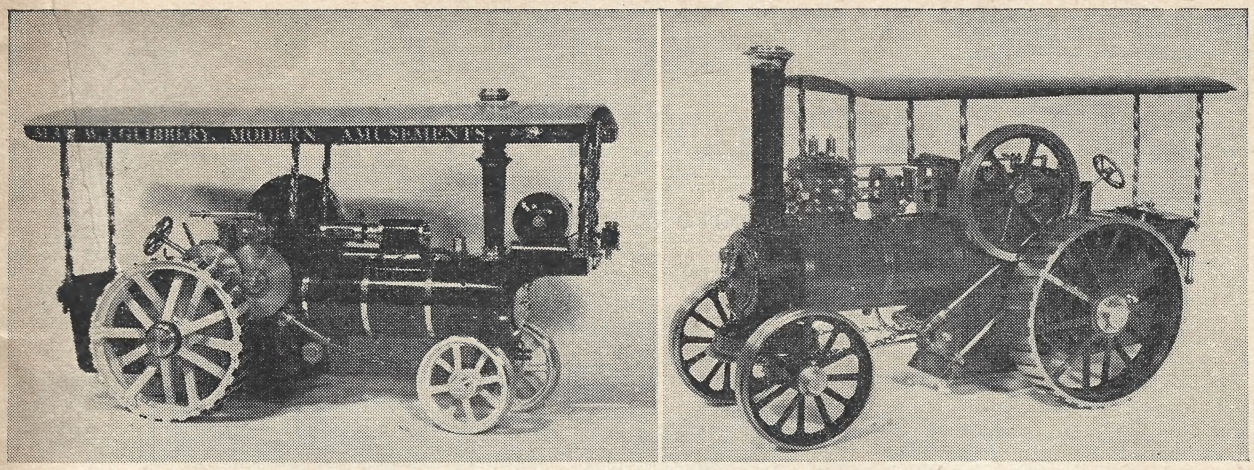
Marks were lost, too, because no dynamo and exciter had been fitted, though the holding-down bolts and belt-tension screws were there. The water-hose was plain red rubber, and the water-lifter oversize, and in places there were very clumsy pipe-unions, notably on the balance-pipe between the tender tank and the belly tank. Here flanged joints should be used, and an expansion unit should be incorporated. In addition a shut-off cock is needed to prevent water from flowing from one tank to the other on steep hills, and so being wasted by overflowing from the filling-orifice.

Other points militating against this engine were clumsy hind wheel rims, over-heavy ornamental brasses supporting the canopy, and too-large rivets on the belly-tank and tender. Yet in contrast the steerage-chains were too light in section.

In one sense, perhaps it could be said that nearly all these faults were not the builder's, as they spring direct from the published drawings. For

N. Spicer of Mansfield exhibited an Allchin at 1½ in. scale





Left : W. J. Glibbery's fairground showman's engine in ¾ in. scale. Right: An exhibit in the loan section

this reason they were not unduly penalised, but at the same time, when we are considering fidelity, we have to take them into account.

Writing of fidelity reminds one of that so-called ¾ in. scale traction-engine design which keeps appearing at exhibitions; it has little in common with genuine traction engine practice ! Here again the faults are inherent in the design itself—proportions entirely wrong, cylinder and motion hopeless, all gearing and even the hind wheels mounted on stub shafts. I can only hope that on seeing examples of this engine, and comparing it with the genuine article, potential builders will transfer their attentions.

High standard

A bronze medal was awarded to P. A. Rucklidge of Belfast for a very attractive 1½ in. scale Allchin. Here again the general standard was excellent. The motion work was well fitted—not tight, but with no slop—and was nicely finished off. The change-speed gears slid easily but with no shake on the splines. On the boiler-front (backhead to locomotive men) the wheel-valves and water-gauge were very neat and realistic.

In the painting there were slight traces of dust, but the paint was without runs and the lining was neat and well carried out. On the cylinder lagging, which should be crimson, the panel was painted black; this may be Mr Rucklidge's personal preference and no marks were deducted for it.

But there were numerous small defects which, all added together, made the difference between the award of a silver medal or a bronze. There was a slight roughness on such castings as the gear-lever quadrant, the tool-tray, and the pump-body which a couple of hours' work with riffler files would have eliminated. The governor was apparently made to work, but did not. Joints were visible where the yokes of the valve rods had been fabricated. There were no number plates, and though dummy lamps were fitted at the front there was none at the rear. It is true that all these are minor points; but they are cumulative, and a few marks here and there matter in competition work.

A second Allchin submitted by N. Spicer of Mansfield was highly commended by the judges as a very worthy and handsome engine, but not quite up to the standard of the other one in several respects. There were, for example, file marks on the eccentric straps and on the caps of the oil-cups. The flywheel spokes were left off an almost rectangular section, instead of being filed oval, and the edges of the steering wheel spokes were not rounded either.

On the trunk guide the ends of the side openings had not been filed out properly, and the studs of the cylinder cover were of uneven length and not cleaned off properly. The hind wheel strakes were uneven, both in length and position, the ends of some even touching the inside edge of the rim, which is, of course, wrong. The change-speed gears fitted well on the splines, but these were in fact separate keys let in to the shaft, instead of being cut from the solid.

The list could be extended, but there was also a brighter side. Mr Spicer's water-hose was better than Mr Rucklidge's, and he had fitted good number plates and a dummy licence-holder. His lamps included one at the rear. Above all he had a very delightful kit of tools; it included a hammer and chisel, oilcan, jack, pliers, footprints, and a set of fixed spanners, all excellently made. In fact, had all the engine been of the same standard as the tools, it would have achieved a much higher award than a highly commended certificate.

In conclusion, may I emphasise once again that in pointing out defects, rather than over-praising the exhibits, my sole purpose is to help ? This year's exhibits *were* a good crop, but if my comments help to make next year's exhibits better, by pointing out mistakes to be avoided, I shall be happy.

" Hughes " Portable Engine

At the Model Engineer Exhibition I had the pleasure of a conversation with Mr R. J. Williams of Holyhead. He told me that he had in his possession the regulator stop-plate from a small portable engine with legend: " H. P. Hughes, Engineer, Holyhead, Engine No 113."

I assured him that despite my having steam in the blood my Welsh forebears were not engineers, and nor did they come from Anglesey ! But it would be interesting to know more about my namesake, who turned out at least 113 engines. Can readers give any information on the firm and its products ? ▣

Exhibition catalogue

Copies of the Exhibition souvenir catalogue may be had from the Sales Department, Percival Marshall Ltd, 19-20 Noel Street, London W1, price 1s. 6d., or 2s. by post.

STILL FAITHFUL TO STEAM

Reviewing the locomotive models at the Exhibition, MARTIN EVANS finds the old loyalties unchanged

So far the dieselisation of our railways has had no effect on the modeller's choice of engine. This year's large gauge locomotives at the Model Engineer Exhibition showed a fine variety, ranging from the simple 0-4-0 contractors' engine to the Pacific express passenger locomotive.

There is no loss of interest in the full-sized engine; out of 13 locomotives only three were freelance. The general standard of workmanship remained very high, but several models were spoilt by unsuitable liveries and unsatisfactory finish. Painting remains the bugbear of most model engineers (including myself); there is no doubt that for those without first-class spraying equipment, the painting of locomotive models is a very difficult art.

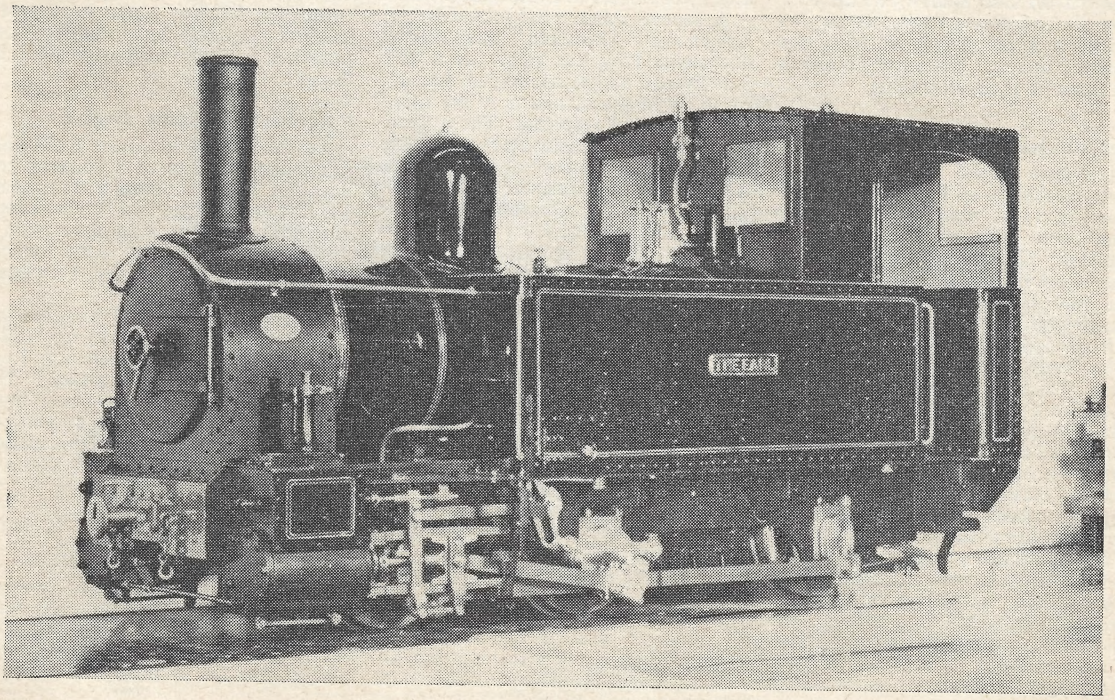
Mr J. H. Balleny of Sheldon, Birmingham carried off the Championship Cup with his narrow gauge (1.4 in. scale, 3½ in. gauge) 0-6-0 tank engine *The Earl*. The original was one of a pair built by Beyer-Peacock and Company in 1902 for the Welshpool-Llanfair Railway.

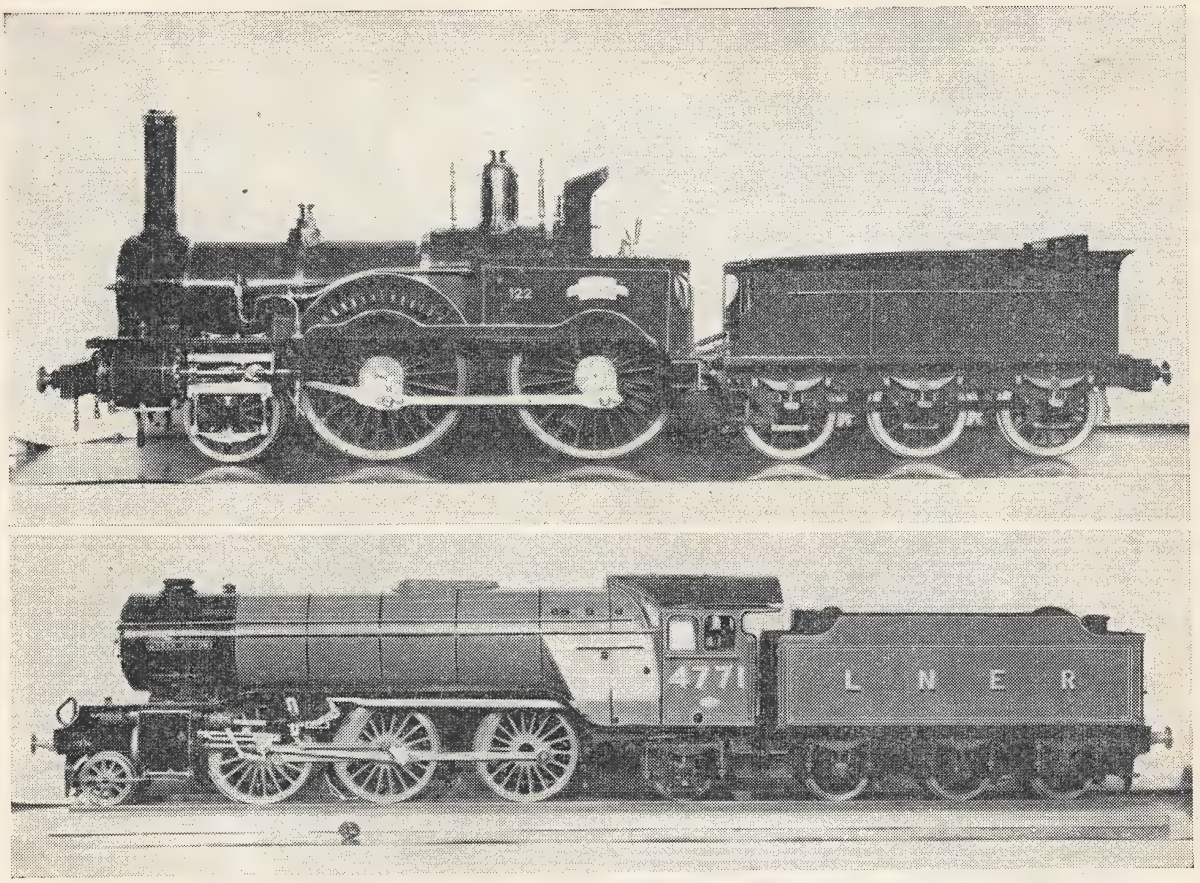
This engine was also awarded the J. N. Maskelyne Memorial Trophy for fidelity to prototype. It had slide valve cylinders and Walschaerts valve gear, the inspection covers for which were very neatly made. A lifting jack was mounted on the left-hand footplate, and the engine had centre couplers and safety chains. The work put into the boiler mountings and beading was first-class, and so was the painting—an eggshell black with a matt smokebox.

The 5 in. gauge model of the LSWR 2-4-0 express *Britannia* by Mr H. Buckle of Ilford, Essex, which was awarded a Silver Medal, was a very fine representation of an unusual engine.

Mr Buckle's model was fitted with crosshead feed pumps on both sides of the engine; the pumps had by-pass valves operated by long rods connected to levers on each side of the cab. Another interesting point was that the bottom slide bars supported the spring hangers of the leading wheels; as the bars were supported by the motion plate at the rear end

J. H. Balleny's narrow-gauge engine THE EARL *represents a tank built in* 1902 *for the Welshpool-Llanfair railway. The model sent a Championship Cup to the Midlands*





Top: H. Buckle of Ilford, Essex, won a Silver Medal with his LSWR BRITANNIA *in 5 in. gauge. Above: This* GREEN ARROW, *which gained G. A. W. Pelling of Wickham, Hampshire, a Bronze Medal, is in bright green—a reminder of the days when railway engines gleamed and glittered*

and by separate brackets bolted to the mainframes at the front end, this would seem to be quite sound practice.

The typical Beattie crossheads were well modelled, though I think that the slippers could have been given a little more depth. I liked the finish of this model very much. The rich red-brown livery and the polished brass dome and safety-valve covers contrasted well with the black parts.

Mr G. A. W. Pelling of Wickham, Hampshire, won a Bronze Medal for his $\frac{3}{4}$ in. scale LNER *Green Arrow*. It was suggested to me that the green livery of this fine model was too bright, but I think that the colour chosen was quite correct. After all, the model was obviously intended to represent the engine fresh from the paint shops, and this it certainly did, although some of the red lining that was painted on the trailing and tender frames had been omitted. We are so used to seeing steam locomotives in a filthy state nowadays that it becomes difficult to remember how colourful some of them looked when they were brand new or had just been repainted.

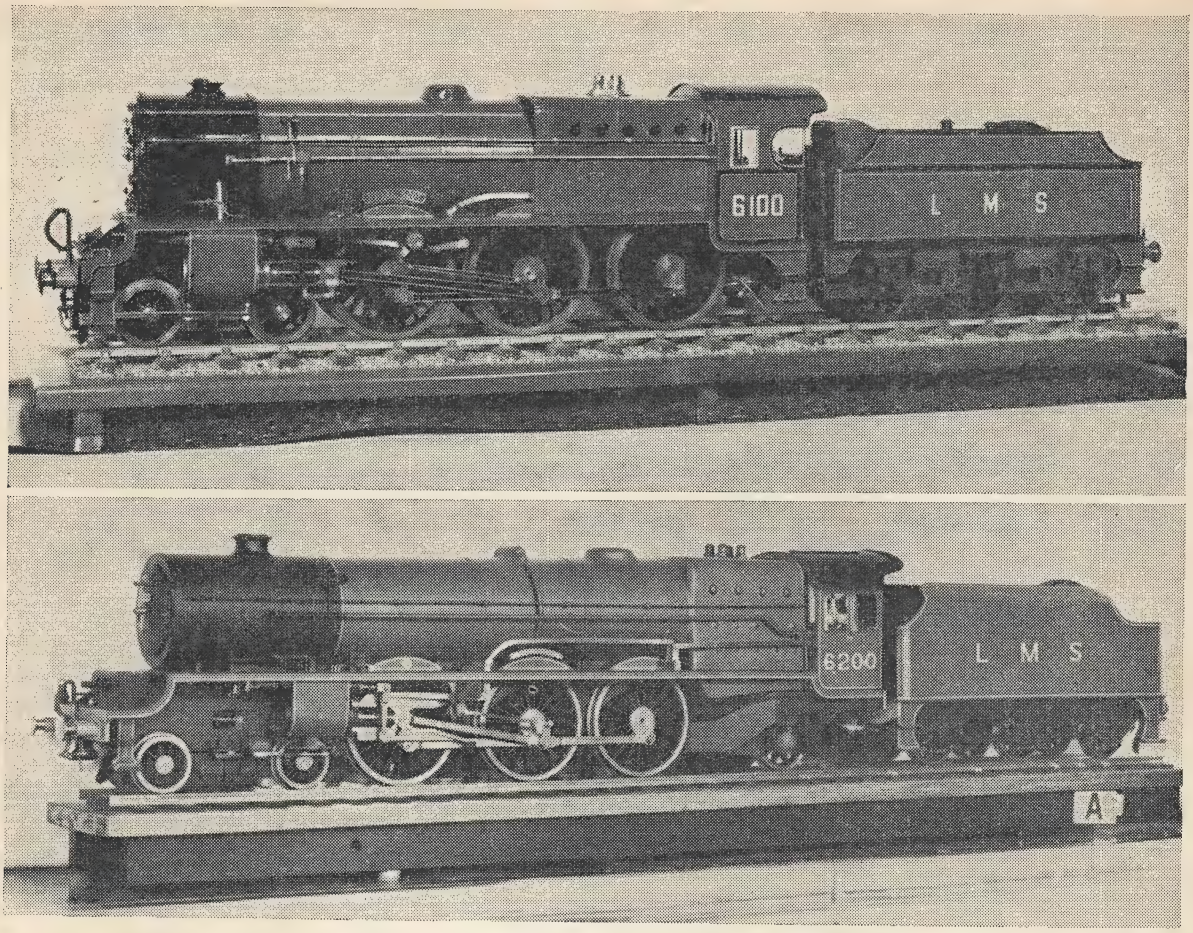
The engine was fitted with three cylinders and the Gresley conjugated valve gear; it looked every inch a product of the famous Doncaster works.

A second bronze medallist was Mr J. F. Banyard of Kelvedon, Essex. I cannot help feeling that Mr Banyard's choice of livery was somewhat unfortunate. The blue he had chosen is a good deal lighter than the old GER blue, which would, I think, have looked better; it was in fact very close to Somerset and Dorset blue. With a white-painted cab roof, the general effect was rather too gaudy for a tank locomotive. It is probable that the painting prevented the model from receiving the highest honours.

Mechanically this freelance 4-6-4 tank was a magnificent piece of work. Four cylinders were fitted, with a balanced crank-axle. The valve gear was Walschaerts and the valves of the inside cylinders were operated by levers connected to the outside valve spindles. Fittings included steam sanding gear, steam brakes with compensating arrangements, and a water pick-up apparatus. Typical of the Great Eastern were the guard-irons bolted to the outside of the front buffer beam.

The $3\frac{1}{2}$ in. gauge LMS 4-6-0 *Royal Scot* by Mr A. G. Peacock of Wroxham, Norfolk, was a good example of a Henry Greenly design. The engine which received a Very Highly Commended, showed sound workmanship and is well finished throughout, though the shade of red paint used is perhaps a little on the light side for LMS livery.

Mr B. Grontoos of Tehtaankatu, Finland (VHC), showed a very fine eight-wheel passenger car of the observation type, to 1/20 in. scale. This is a centre-gangway coach. The interior fittings and upholstering are very well carried out. The bogies are of unusual design with the main



Top: Very Highly Commended—3½ in. gauge ROYAL SCOT *by A. G. Peacock of Wroxham, Norfolk, who used the Henry Greenly design. Above: A. B. Miles of Greenford, Middlesex, was Highly Commended for the* PRINCESS ROYAL, *another LBSC engine once described in* MODEL ENGINEER

axle bearings supported by horizontally disposed helical springs through angle cranks.

An LMS 4-6-2 *The Princess Royal* built by Mr A. B. Miles of Greenford, Middlesex, in 17/32 in. scale (Highly Commended) is a very good example of an early design by LBSC. It is very well finished, and the painting and lining are first-class, though I think the maroon colour lacked the characteristic richness of the LMS livery. The four cylinders are fitted and all the usual accessories.

Mr C. J. Goulding of Newport, Monmouthshire, showed a nice example of LBSC's *Pansy* design, a GWR 5700 class pannier tank for 5 in. gauge (Commended). The platework, especially on the top of the boiler and tanks, was not quite up to the standard set by the remainder of the engine.

The Wilwau prize was awarded to yet another example of the ever-popular *Tich* 0-4-0 contractor's tank engine in 3½ in. gauge. It was the work of Mr S. A. Davey of London SW9, and was notable in that it had a Duplex donkey pump for water feed, in addition to an injector. Hand brakes were fitted and the locomotive was finished in a green livery very similar to that of the old GWR.

Mr N. C. Gregory of Beckenham, Kent, won the A. J. Reeve's prize for a powerful 2-8-2 narrow gauge two-cylinder Colonial type engine based on the *Zoe* design. Other locomotive models were a 2½ in. gauge freelance Pacific to the *Fayette* design with American type details, by Mr G. Kimber of Maidstone, Kent, and a 3½ in. gauge British Railways class 4 2-6-4 tank engine by Mr E. Hinchliffe of Rochdale, Lancashire. The tank had valve gear to the *Princess Marina* design. ▣

ZIRCON SAND FOR MOULDING

THE use of zircon sand for small precision foundry moulds has increased in recent years. It has not been used for large castings, largely on the grounds of expense.

Experiments in the Scunthorpe Foundry of Thomas Firth and John Brown Ltd, have, however, led to the use of zircon sand for nearly all large moulds which were formerly made in "Sheffield Compo" high-alumina refractory.

The cost of zircon sand is some four times as much as that of "compo." But it has been found that a mould prepared by facing with ⅛ in. to ¾ in. of zircon facing sand, backed by ordinary sand, costs about the same as a normal "compo" mould. The pattern strips more easily, hence less time and money is wasted on repairing moulds and patterns. Similarly the casting strips cleanly and easily and reduces the need for fettling. The greater chemical stability of zircon sand reduces interaction with iron or iron oxide.

Based on an account of a paper delivered to the Lincolnshire Iron and Steel Institute by B. W. Midgley, published in *Metal Bulletin*.

FLAT FACES

By GEOMETER

THERE are few components without at least one functional flat face among their features. As simple examples, plain washers are flat each side. Nuts are flat on their undersides, bolt heads flat at their shoulders. It goes without saying, of course, that important faces like those of surface plates should be flat. The same is true for the bases of surface gauges, and the faces of micrometer anvils and spindles. Yet flatness is a quality which cannot be taken for granted.

There are washers—not neatly parted off—which are improved by rubbing on a flat file or a Swiss file, according to their size. This occasionally applies to nuts—which should be fitted flat side down on their bolts or studs. As for bolts or screws in quantity, one can always—as with apples—be at pains to pick out the good ones.

In the preservation of flat faces, care constantly exercised is very important—particularly for tools. Automatically, one should wipe, with a clean rag, surface plates, slides and the undersides of surface gauges. When micrometers are to be closed to zero, notepaper should first be gripped lightly between their anvils and spindles, and then drawn out, leaving the faces clean.

In machining flat faces on the lathe, numerous factors influence the results. They include the shape and sharpness of tools, the rate of feed, the rotational speed of work, and good adjustment of slides. Except for light facing cuts on small parts, the saddle should always be locked to the bed. This can be done by engaging the leadscrew nut in the absence of other provision; and the topslide screw should be turned to eliminate backlash. For a large facing job, optimum resistance to thrust is obtained from a bar bolted across the bed behind the saddle.

Given basic accuracy, the correct butting together of two flat faces can still be made impossible by inattention to detail features. A sharp corner should be machined where a flat face joins an outside diameter (the spigot on a cylinder cover, for example); while the corresponding bore (end of cylinder) should have a chamfer. Both outside edges or diameters should be lightly chamfered, as should the mouths of holes that are tapped, and the ends of holes which are drilled to pass studs or bolts.

The facing of surfaces which are not quite flat can often be done by rubbing them on a smooth file. They may also be rubbed on a sheet of emery cloth on a surface plate. Fine finishes are obtained by lapping.

A thin film of fitter's blue, or red lead and oil, on a face will reveal the contact areas of a mated one, for correction by filing or scraping. Alternatively a straightedge can be placed on work, as at *A*, to check for gaps against a strong light. Again, strips of paper, 1, 2, 3, should be equally gripped on a good surface.

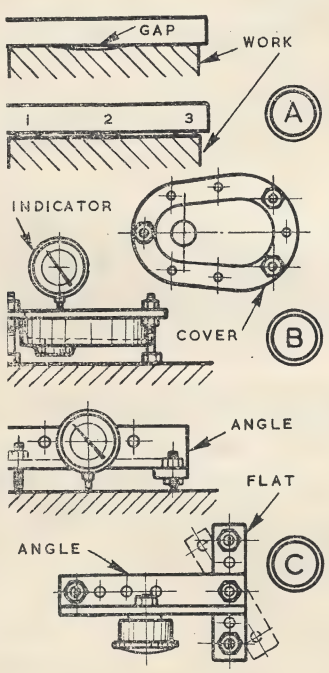
With a surface plate, and with suitable setting up of the work, a surface gauge and indicator afford an excellent means for testing flatness. One example, as at *B*, is the flange of a cover, which can be supported and levelled by three bolts. Then the indicator can be run round.

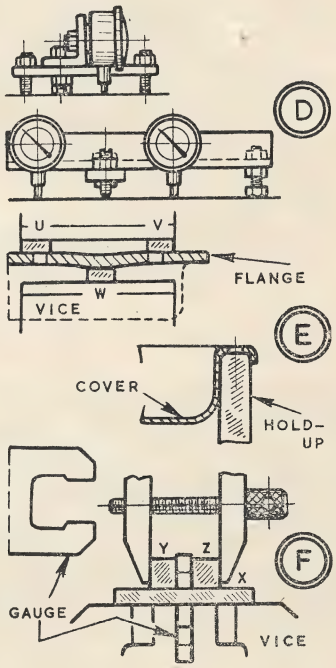
On occasion, it is necessary to check the accuracy of the surface which supports testing equipment—the cylinder block of an engine, for example. For this, the indicator should have a low support, which can be provided through angle iron and a flat strip bolted together, with three screws for feet, as at *C*. The flat strip may be angled to clear bores or waterways.

A large surface plate (sheet of glass to be packed) can be verified on a similar principle, with a device, as at *D*, employing two indicators, one beyond the feet.

Corrective measures for truing faces include straightening the flange of a cover, as at *E*, with blocks (*UVW*) stuck by adhesive tape to the vice. The flange of a sheet metal cover can be hammered on a rectangular hold-up.

To keep a small face flat in lapping, as on a gauge, guard block should be clamped each side, as at *F*. To keep all level, a flat piece (*X*) is laid on the vice; then gauge and blocks (*YZ*) are pressed on it and clamped. ▣

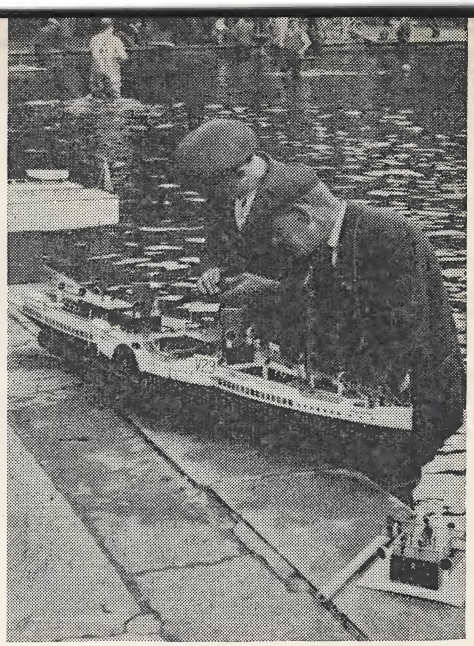




NEWS REPORT—1

Regattas in London

—at Victoria and Blackheath



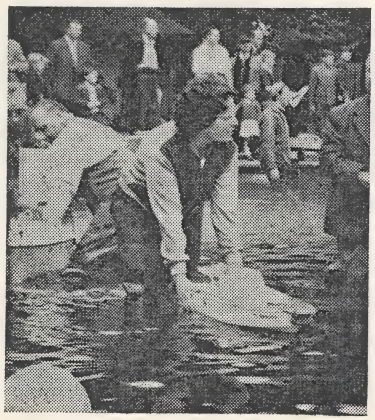
MANY competitors, including well known power boat enthusiasts, attended the Victoria regatta for straight-runners and hydroplanes at Victoria Park in London.

Victoria club more than held its own in the free-running events, with first, second and third in the nomination and the Vanner Trophy, and the first and third in the steering. There was heavy competition from most of the London clubs and from several others.

The present trend in straight-runners towards the launch-type boat makes the genuine prototype boats stand out all the more. It was good to see F. Eltridge, one of the veteran Victoria members, win the nomination with nil error. His boat was the famous paddle-steamer *Royal Sovereign*, well known to visitors at Victoria Park.

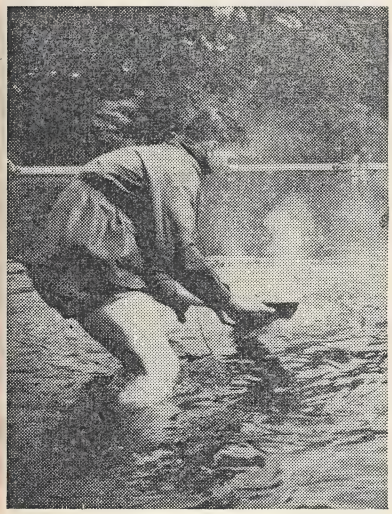
In the steering competition scoring was close. Three competitors managed to tie for first with 13 points: Mrs C. Washington (Victoria), Mr Wallon (Forest Gate) and Mr Walker (Victoria). On the first re-run all three missed the targets, but on the second Mrs Washington managed an inner against more misses. This secured her first place. Further re-runs were needed to sort out the second, third and fourth place, for other competitors were level at 12 points.

Right: Here are the Eltridge brothers looking over the old ROYAL SOVEREIGN *which had recently been fitted with a new set of diagonal paddle engines. Below: Mrs F. Dixon (Victoria) waits for the signal in the nomination race*



No sensational speeds were achieved in the hydroplane events, but few boats capsized. Peter Lambert (St Albans) did well in the Class D and C Restricted races and A. Rayman (Blackheath) made his best speed with his Class A boat *Crazy Rhythm* 3 at 57.29 m.p.h.

For the free-runners at Blackheath Regatta in London, the shape of the



Left: Colin Stanworth (Fleet) starts his C class hydroplane. Centre: New D class hydroplane by Mr Blacknell (St Albans). Right: C. Starnes (Victoria) starting his hydroplane, also D class

RESULTS AT VICTORIA MSC REGATTA

80 Yard Nomination Event

1. F. Eltridge (Victoria)	*Royal Sovereign*		Nill Error
2. Mrs C. Washington (Victoria)	*V* 54		2.6 per cent
3. A. Ayris (Victoria)	*V* 103		2.63 ,, ,,
4. A. Barham (Blackheath)	*BH* 15		6.7 ,, ,, w

Steering for the Vanner Trophy

1. Mrs. C. Washington (Victoria)	*V* 54	13 + 0 + 3
2. ?. Wallon (Forest Gate)	*F.G.*31	13 + 0 + 0 + 3
3. R. Walker (Victoria)	*V*102	13 + 0 + 0 + 0
4. J. Cleary (Blackheath)	*Via Media* 2	12 + 3

500 Yard Class D Race

1. P. Lambert (St Albans)	—	51.14 m.p.h.
2. T. Everitt (Victoria)	—	46.07 ,,

500 Yard C Restricted Race

1. Peter Lambert (St Albans)	*Rhumba* 3	65.35 m.p.h.
2. C. Starnes (Victoria)	—	46.07 ,,

500 Yard Class B Race

1. F. Dixon (Victoria)	*Snudge*	58.11 m.p.h.
2. T. Dalziel (Birmingham)	*Naiad* 3	53.4 ,,

500 Yard Class A Race

1. A. Rayman (Blackheath)	*Crazy Rhythm* 2	57.29 m.p.h.
2. N. Fort (Victoria)	—	44.27 ,,

RESULTS AT BLACKHEATH MPBC REGATTA

50 Yard Nomination Event

		Error
1. P. Jesset (Blackheath)	*Pandora*	0.8 per cent
2. G.Webb (Victoria)	*V.*36	2.5 ,, ,,
3. R. Barham (Blackheath)	*BH* 15	2.7 ,, ,,
4. R. Hawes (Blackheath)	—	4.0 ,, ,,

Steering Competitikn. (Poss. points 25)

1. J. Cleary (Blackheath)	*Via Media* 2	19 points
2. A. Clay (Blackheath)	*Elizabeth*	9 ,,
3. R. Barham (Blackheath)	*BH* 15	9 ,,

(2nd and 3rd places after re-run)

Class D Race 500 Yards

1. P. Lambert (St Albans)	—	53.83 m.p.h.
2. T. Everitt (Victoria)	—	52.18 ,,

C Restricted Race 500 Yards

1. P. Lambert (St Albans)	*Rhumba* 3	58.11 m.p.h.
2. C. Stanworth (Fleet)	—	56.82 ,,

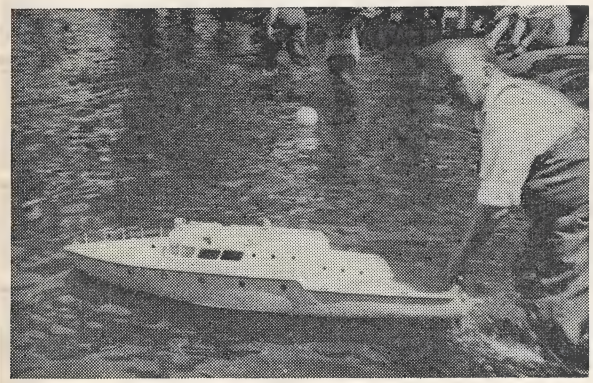
Class B Race 500 Yards

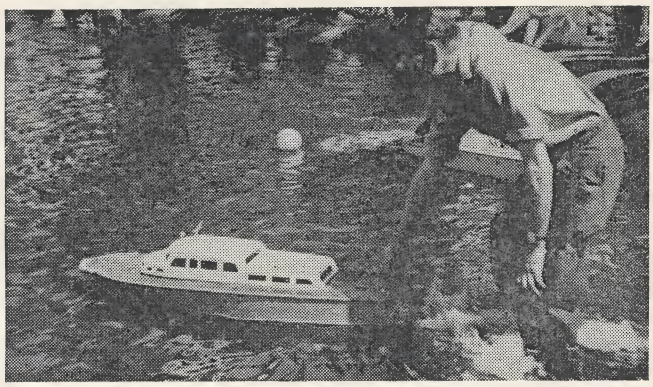
1. F. Dixon (Victoria)	*Snudge*	54.11 m.p.h.
2. S. Poyser (Victoria)	—	26.1 ,,

Class A Race 500 Yards

1. A. Rayman (Blackheath)	*Crazy Rhythm* 2	53.27 m.p.h.
2. N. Fort (Victoria)	—	44.08 ,,

Team Steering for the Cleary Trophy, St Albans MES





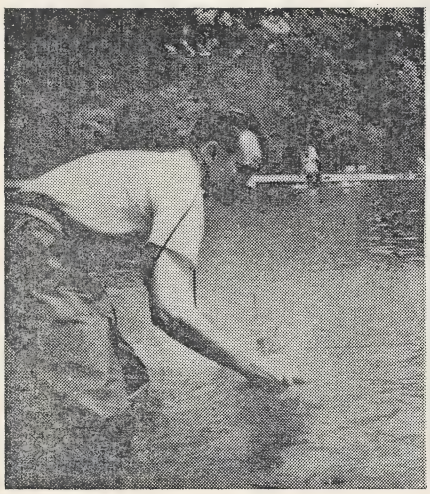
Left: L. G. Curtis (St Albans) with a new fibre-glass hull at Blackheath Regatta. Right: J. Lockhart (Kingsmere) in the nomination race at Blackheath

Princess of Wales Pond determines the course which they use to get a distance of 50 yards. This means that the boats do not run very near the banks. In the nomination race, many craft fail to reach the finishing line if they are not able to maintain a reasonable course; few fend-offs are possible.

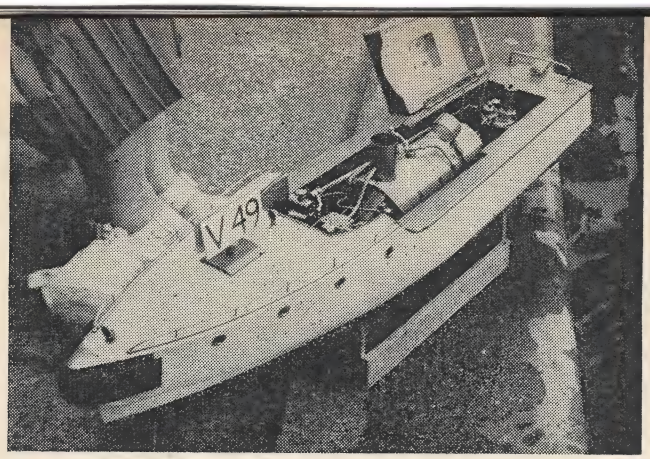
An innovation in the steering event at this year's regatta was a rule allowing a boat five runs, using the 5-3-1 scoring system. Only J. Cleary of the home club managed a high score, with 19 points out of a possible 25. Second and third were also Blackheath members—A. Barham and A. Clay, both with 9 points. A re-run decided the final placing.

The Cleary Trophy for team steering was also decided in this event. Three boats to a club have to be nominated in advance; unfortunately for the home club, the winner of the individual event was not nominated.

St Albans team won with a score



S. Poyser of Victoria (left) with his C class hydroplane and Peter Lambert of St Albans with the D class record-breaker described in MODEL ENGINEER



Left: This boat by A. Perkins (Victoria) marks a welcome return to steam. Right: G. Staines brought a new boat with hydrojet propulsion

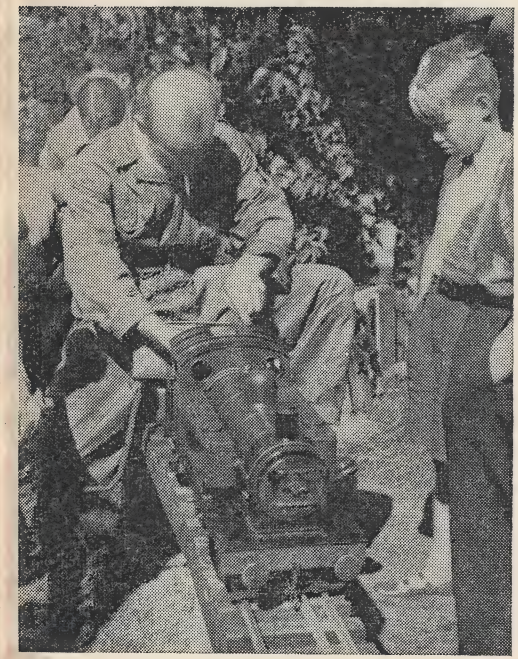
of 12 out of 75. The steering course is notoriously a difficult one, but on this occasion a cross-wind may have had something to do with the poor scoring. A special club trophy, the Junior Skipper, could not be awarded, for no one could be found who fulfilled all the conditions. They require the junior member to have built a substantial part of his boat and to have achieved a good performance. It is to be hoped that the trophy will not go begging next year.

After the nomination event the hydroplane events were run off. The results were substantially a repeat of the previous week's event at Victoria, but most competitors recorded somewhat lower speeds. Colin Stanworth, now of the Fleet MPBC, was an exception. On his second appearance at a regatta, with an unconventional-looking craft, he achieved 56.8 m.p.h.

No entries were received in Class C. Several in Class D, for 5 c.c. engines, performed very well.—MERIDIAN.

NEWS REPORT—2

Steam in a Scottish Garden



Right: Colin Spence drives a freelance 2-6-4 by Mr McLuckie of Falkirk club. Above: Does he attend so seriously in class? A young spectator takes it all in as Harry Merson stokes his BUTCH

MODEL ENGINEER

EDINBURGH Society of Model Engineers has an 80 yard oval, laid for 3½ in. and 5 in. gauges in a secluded garden, generously put at the disposal of the club by the secretary, Mr James H. Farr.

During the 1959-60 season, club members were engaged in marking out the ground and planning the construction. This summer the track was officially open.

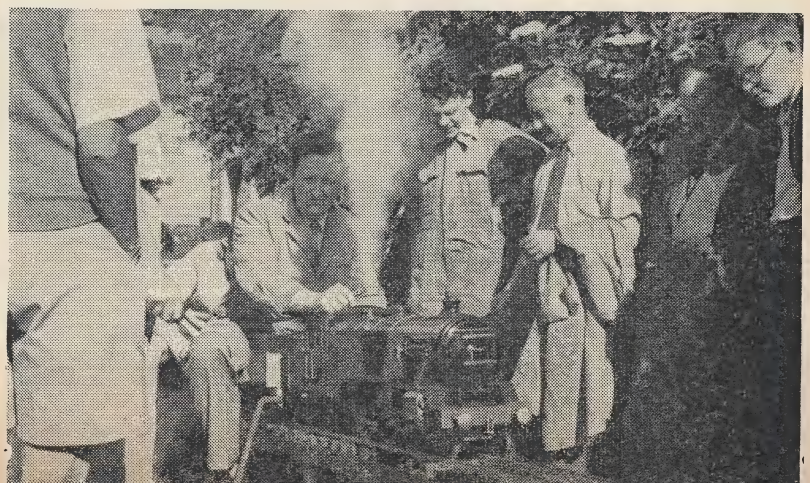
Track construction

Flat-bottomed aluminium alloy rail (specially drawn for the club) is screwed to the sleepers, which in turn are nailed to 9 in. × 2 in. sectioned timbers supported at intervals of 5 ft 6 in. on concrete pillars, into the top of which screwed bolts are set. A movable section gives access down the garden path. All corners are super-elevated by the insertion of tapered wedges under the sleepers.

The club locomotive is a 5 in. gauge engine based on LBSC's *Dyak*. It performs tirelessly and has been in steam for eight hours at a stretch.

Friends from far and near were invited to the track opening and more than 200 came. A number of visiting locomotives added extra interest.

Edinburgh SME also has a 120 ft straight portable track which has operated for several years. The live steam locomotives are a never-failing source of attraction wherever they are taken.—DOUGLAS J. SPENCE.



Model Engineer EXHIBITION

RESULTS OF COMPETITIONS

DUKE OF EDINBURGH TROPHY

Rear Admiral C. M. Blackman (Bishops Waltham), HMS *Victory*, 1/96 in. scale.

1st runner up—**G. E. Hartung** (Gravesend), triple expansion marine engine, ¾ in. scale.

2nd runner up—**BR Apprentices Training School** (Crewe), BR class 8, 4-6-2 locomotive *Duke of Gloucester*.

RAILWAY SECTION

CLASS A
LOCOMOTIVES 2½ in. GAUGE AND OVER

Championship Cup and Maskelyne Memorial Trophy—**J. H. Balleny** (Sheldon, Warwickshire), 0-6-0 tank locomotive, *The Earl*.

Silver Medal—**H. Buckle** (Ilford, Essex), LSWR *Britannia*, 5in. gauge.

Bronze Medals—**J. F. Banyard** (Kelvedon, Essex), 4-6-4 express tank locomotive, 3½ in. gauge; **G. A. W. Pelling** (Wickham, Hampshire), LNER V2 *Green Arrow*, 3½ in. gauge.

VHC—**A. G. Peacock** (Wroxham, Norfolk), LMS 4-6-0 *Royal Scot*.

HC—**A. B. Miles** (Greenford, Middlesex), LMS Pacific *The Princess Royal*.

C—**C. J. Goulding** (Newport, Mon.), GWR 0-6-0 pannier tank locomotive.

Wilwau Prize—**S. A. Davey** (London SW9), 0-4-0 contractors' locomotive, 3½ in. gauge.

A. J. Reeves and Co. Prize—**N. C. Gregory** (Beckenham, Kent), 2-8-2 narrow gauge Colonial locomotive.

CLASS B
LOCOMOTIVES, GAUGES "1" and "O"

C—**R. A. Warboys** (Peckham, London), 4-6-6-4 Western Maryland Railroad locomotive.

CLASS BA
LOCOMOTIVES "OO" GAUGE AND UNDER

Bronze Medal—**L. H. Brown** (Neasden, Middlesex), Southern Schools class locomotive and three coaches.

HC—**E. W. Ballinger** (New Malden, Surrey), LSWR 0-6-0; **R. T. McMillan** (Hayes, Middlesex), Highland Railway 4-4-0 tank locomotive and goods train; **R. A. Warboys** (Peckham, London), 0-8-0 "Z" class locomotive.

C—**T. S. Nunn** (Kingsway), 4-4-0 Midland Compound locomotive; **B. Wright** (New Malden), LSWR 0-4-4 T1 tank locomotive.

CLASS C
ROLLING STOCK AND ACCESSORIES, GAUGES "1" and "O"

VHC—**B. Grontoos** (Finland), railway car.

HC—**D. J. Wigley** (Esher, Surrey), Ex-LSWR luggage van; **N. D. Wigley** (Esher), LNER full brake.

CLASS CA
ROLLING STOCK, GAUGE "OO" AND UNDER

Silver Medal and *Model Railway News* Prize—**J. Whittaker** (Manchester), seven GWR assorted passenger vehicles.

VHC—**B. Wright** (New Malden), LSWR bogie guard's van.

MARINE SECTION

CLASS D
STEAM AND MOTOR SHIPS, ANY PERIOD, NON-WORKING

Bronze Medal—**J. S. Baines** (Sidcup, Kent), Thames fire-float.

HC—**D. L. Grainger** (Eyemouth, Berwickshire), HMS *Amphion*.

C—**R. H. Fawell** (Chalfont St Giles, Bucks), motor vessel *Pateke*.

CLASS E
POWER DRIVEN SHIP MODELS

Championship Cup and USSR Marine Cup—**A. Sallis** (Brighton), Barnet-class lifeboat.

Silver Medal—**D. S. Paterson** (Maidstone), steam drifter *Young Cliff*.

Bronze Medal and ME Prize—**D. R. Davidson** (Brentwood, Essex), *St Ninian* 1/5 in. scale.

Bronze Medal and Exide and Drydex Challenge Cup—**C. J. Pollington** (Sholing, Hampshire), sea-going tug; **L. Whiteman** (York), Thames tug *Cervia*.

VHC—**A. A. Crick** (Bexley, Kent), electric-powered launch; **C. Ledwidge** (Huddersfield), fishing vessel, 1/20 in. scale; **C. J. Pollington** (Sholing), cabin cruiser.

VHC and Model Power Boat Prize—**J. F. Coppin** (London, W4), open speedboat.

HC—**R. P. Nolan** (Luton, Beds), battle cruiser *Scharnhorst*.

C—**R. F. Moore** (Rochester, Kent), Admiral's barge; **R. F. Eva** (London E9), ocean-going tug; **P. F. Harper** (London SE9), cabin cruiser radio-controlled; **S. Mahood** (Brighton), steam-driven pinnace.

CLASS F
NON-WORKING SAILING SHIPS, ANY PERIOD

Silver Medal—**L. C. Gough** (London SE13), gun brig.

HC—**R. G. Hutson** (Watford), sailing warship *Adler Von Lubeck*; **G. Hollingsworth** (Scunthorpe, Lincs), sailing craft *Helen*.

C—**E. V. Lane** (Margate), four-masted barque *Herzogin Cecilie*.

CLASS G
WORKING YACHTS AND SAILING SHIPS

Silver Medal and John Fisher Prize—**J. A. Thompson** (Leicester), USA revenue cutter.

Silver Medal—**E. A. Allchin** (Ruislip, Middlesex), tea clipper *Ariel*.

Bronze Medal and Maze Cup—**J. M. Russell** (Potters Bar, Herts), Roman merchant ship.

Bronze Medals—**F. Hinchliffe** (Huddersfield), HM brig *Martin*; **G. Fitz-Gerald** (London SW12), "R" boat, 36 in. length.

VHC—**W. A. Brewer** (Greenwich), Lowestoft sailing trawler *Master Hand*.

HC—**J. M. Russell** (Potters Bar), three fishing boats *Patsy*, *Elspeth* and *Anette*; **A. K. Williams** (Burgess Hill, Sussex), Fiji Island ndrua or double canoe; **E. W. Rogers** (Epping, Essex), 18 in. dinghy.

CLASS H
HYDROPLANES AND SPEEDBOATS

Silver Medal and Willis Cup—**A. A. Rayman** (Forest Hill, London), high-speed steam launch.

Bronze Medal—**C. L. Staniforth** (Shoreham-by-sea, Sussex), speedboat 2 in. scale.

CLASS J
MINIATURES

Championship Cup—**D. Hunnisett** (Aylesbury, Bucks), four-masted barque *Magdalene Vinnen*.

Silver Medal and Sawers Prize—**Miss J. Barton** (London W1), early 14th century and three-masted 15th century English ships.

Silver Medal—**D. A. Hughes** (London SW3), Palm liner *Elmina Palm*.

Bronze Medal—**W. G. Tampin** (Dartford, Kent), Thames barge *Kathleen* and Thames tug *Cervia*.

VHC and H. V. Evans Trophy—**E. C. Freeston** (Cross-in-Hand, Sussex), Whitby coble.

VHC and a Dennison Prize—**J. T. King** (Thornton Heath, Surrey), Swedish East Asiatic Company's m.s. *Sumatra*.

VHC and 3 guinea voucher—**D. G. Haws**, Marlow, Bucks.

HC and a Dennison Prize—**D. G. West** (London SW12), USS *Constitution* (Old Ironsides) 1/32 in. scale.

HC—**C. Seston** (Hanwell, London), BP tanker.

C—**J. A. Evans** (Southend-on-Sea, Essex), HMS *Victory* and *Cutty Sark*.

CANBERRA COMPETITION

No award this year.

GENERAL ENGINEERING SECTION

CLASS K
GENERAL ENGINEERING

Championship Cup and Crebbin Cup—**T. C. Stephens** (Sudbrook, Mon.), Cornish beam engine.

Silver Medal—**H. J. Trevett** (Southbourne, Hampshire), Newcomen's atmospheric pump engine and collection of six beam engines; **C. Cole** (Ampthill, Beds), quadruple expansion marine engine.

Bronze Medal—**J. W. Ravenscroft** (Headingley, Yorks), ME beam engine.

VHC—**J. W. Gibson** (Stockport), horizontal type engine; **F. Skelton** (Herne Bay, Kent), beam engine.

HC—**E. B. Wilcox** (Northwich, Cheshire), twin-cylinder marine engine; **J. Hollins** (Stoke-on-Trent), main and tail haulage engine.

C—**J. W. Gibson** (Stockport), double Tangye mill engine.

CLASS L
INTERNAL COMBUSTION ENGINES

Bronze Medal—**F. G. Bettles** (Taunton), *Sea Lion* petrol engine.

VHC—**H. W. Hooper** (Birmingham), vertical twin petrol engine; **N. W. Portlock** (London W6).

HC—**L. J. Oldridge** (Exeter), *Centaur* gas engine.

C—**G. Kershaw** (Uckfield, Sussex), *Kiwi Mk* 2 petrol engine; **E. Parker** (Glossop, Derbyshire), *Centaur* gas engine.

CLASS M
MECHANICALLY PROPELLED ROAD VEHICLES

Championship Cup and Aveling-Barford Trophy—**W. Jarvis** (Sandbach, Cheshire), five-ton compound traction engine.

Silver Medal—**E. Baigent** (Windlesham, Surrey), Burrell scenic road locomotive *Fair Lady*.

Bronze Medal—**P. Rucklidge** (Belfast), Allchin traction engine.

HC—**N. Spicer** (Mansfield, Notts), Allchin traction engine.

HC **J. A. Mackay,** (Farnborough)—traction engine.

CLASS O
TOOLS AND WORKSHOP APPLIANCES

Bronze Medal—**A. H. Wilks** (Lydney, Gloucestershire), watchmaker's lathe.

VHC—**B. C. Wood** (Banbury, Oxfordshire), spherical turning attachment; **D. N. Vick** (Stroud), dividing head and twist-drill grinding jig.

HC—**G. D. Chambers** (London SE6), D-T indicator stand, comparator, and case.

CLASS P
ENGINEERING SCALE MODELS

Silver Medal—**W. R. Bayliss** (Kidderminster), Brinton gripper carpet loom.

Bronze Medal—**C. H. Toogood** (Sudbury, Suffolk), Cugnot's steam carriage; **H. W. Hooper** (Birmingham), Royal Enfield motorcycle.

(continued on p. 302)

By J. N. MASKELYNE

Dugald Drummond's Double Singles LSWR

I CAN only describe Dugald Drummond's group of six extraordinary locomotives as a peculiar experiment, and I recall quite clearly that, as a boy, I was fascinated by the unusual arrangement of the side rods and for a long time tried unsuccessfully to fathom what it was all about.

When I arrived at years of wisdom, I realised that some influence had been derived from F. W. Webb's three-cylinder compound engines for the London and North Western Railway. Drummond would not have anything to do with compounding in locomotives, but he seems to have had a fancy for Webb's idea that four driving wheels, uncoupled, provided the freedom of a singlewheeler and the adhesion of a four-coupled engine. Consequently, he adopted four uncoupled driving wheels in his first express passenger engine for the London and South Western Railway.

This engine was No 720, classified T7, and turned out of Nine Elms Works in August, 1897. There was a leading bogie with 3 ft 7 in. wheels 6 ft 6 in. apart. The four driving wheels were 6 ft 7 in. dia., and the two uncoupled axles were no less than 11 ft from each other. The wheelbase was 25 ft 11 in., and the overhang 2 ft 1 in. in front and 4 ft behind.

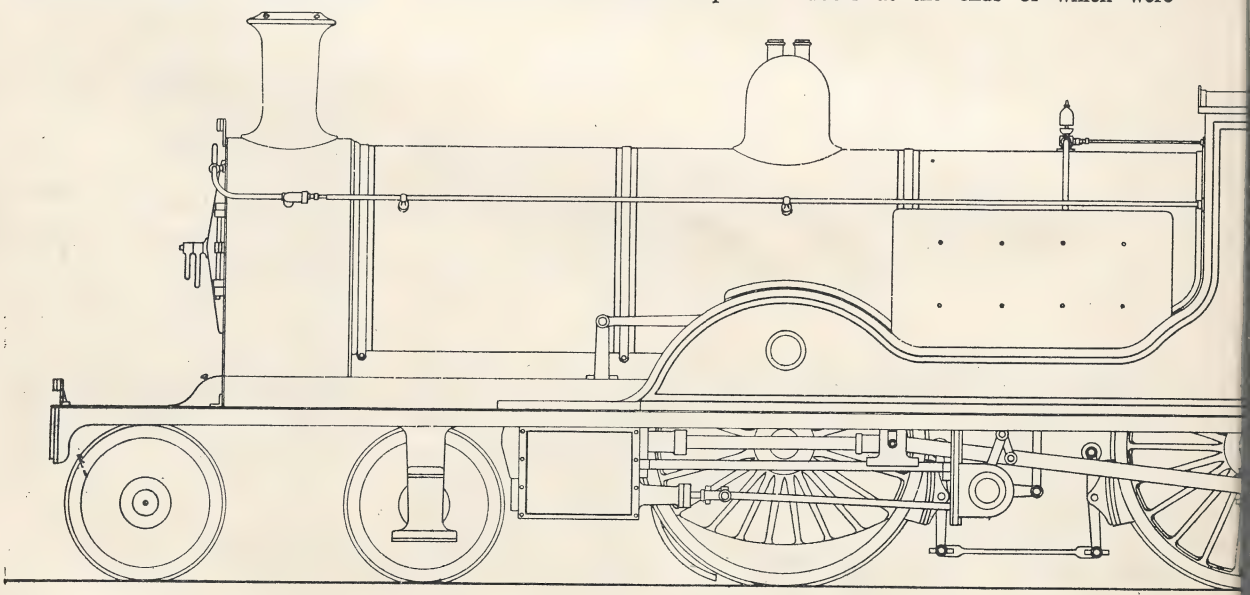
Two cylinders were arranged inside below the smokebox and two outside between the rear bogie wheels and the forward driving wheels. The outside pair drove the trailing wheels, with the outside piston rods lengthened considerably, so that the four connecting-rods should not be too unequal in weight and length. As it was, the outside rods were 9 ft long and the inner ones 6 ft 6 in. The cylinder diameter was as much as 16½ in. and the stroke was 26 in.

The boiler was of the usual form in two rings, 4 ft 5⅛ in. and 4 ft 6 in. in diameter, and the length of the barrel was 12 ft. The distance between tubeplates was 12 ft 4 in. and the centre-line was 7 ft 9 in. above rail level. There were 271 tubes of 1½ in. dia.; their heating surface was 1,307 sq. ft. The firebox shell was 8 ft 4 in. long, and the inner box 7 ft 6 in. long, with a heating surface of 142 sq. ft. Seventy-two water tubes of 2½ in. dia. connected the water spaces at the sides of the firebox and added 195 sq. ft to the heating surface, the total of which was 1,664 sq. ft. The grate area was 27.4 sq. ft. and the working pressure 175 p.s.i.

No 720 was the first example of Drummond's predilection for using two different types of valve gear on one engine, Joy's for the outside valves and Stephenson's for the inside, two sets for each; the four gears were controlled by one steam operated reverser similar to James Stirling's on the SER engines.

It is scarcely surprising that No 720, on her steam trials, displayed idiosyncrasies and habits entirely her own. The most distressing of them was a tendency to run short of steam very quickly. To counteract this, she was returned to the factory to have the cylinder diameter reduced to 15 in., after which she was less short-winded and was put into traffic. But there was still some difficulty in maintaining an adequate steam supply, and in 1899 the cylinder diameter was altered to 14 in., with an improvement that satisfied Drummond so much that he decided to build five more engines of the same type.

These later engines were numbered 369 to 373, classed E10 and completed between April and July 1901. They differed from No 720 in having 14 in. cylinders when they were new, double instead of single slidebars, 280 firetubes of 1½ in. dia. and 72 water tubes of 2¾ in., the inspection doors at the ends of which were



enclosed in what afterwards became the standard casings at the sides of the outer firebox. The heating surfaces were: firetubes, 1,344 sq. ft; water tubes 190 sq. ft, and firebox 156 sq. ft; total, 1,690. Bogie-wheel splashers, which were originally placed on No 720, were omitted.

At about this time the Whyte system of classifying locomotives according to wheel arrangement had been widely adopted; in this an engine with a leading bogie followed by two independent axles and no trailing carrying wheels was indicated, obviously, as 4-2-2-0. Yet the London and South Western Railway and, many years later, its successor the Southern Railway, persisted in classifying the T7 and E10 engines as 4-2-2. For a long time enthusiasts engaged in a wordy warfare over which of these two classifications was correct. Odd as it may seem, the question was never settled.

Trust a sharp-witted schoolboy to produce an unarguable answer to such a question ! One day, I was with a bright, cheerful young loco-spotter looking at one of these curious engines, when suddenly he shouted " I've got it ! "

" Got what ? " I asked, somewhat surprised.

" The right name for these engines."

" Oh ! " I said, " what is it ? "

With a broad grin he replied: " Double Singles."

This distinctly Irish-sounding, but remarkably apt, description spread quickly through Surrey and Hampshire and even into Devon, and by the lay fraternity the engines were referred to as " Double Singles " for the rest of their existence.

In 1905 No 720 was rebuilt with a larger boiler, and in this form she was a really fine looking engine. She became so familiar, and such a favourite with LSWR fans, that I shall make her the subject of my next article; so, for the present, we will take leave of her.

None of the E10 class was ever altered, except in the style of painting; my drawing shows the original Drummond livery. In working order, the engine weight was 58 tons 14 cwt, divided into 20 tons 10 cwt on the bogie, 19 tons 5 cwt on the forward driving axle, and 18 tons 19 cwt on the trailing axle. The adhesion weight was, therefore, as much as 38 tons 4 cwt, which exceeded that of any four-coupled engine on the LSWR at that time.

The tenders of the E10 class were 4,500-gallon, with a wheelbase of 14 ft 6 in. divided into 5 ft plus 4 ft 6 in. plus 5 ft, with overhang of 5 ft 6 in. at the front and 4 ft 5 in. at the back. This loaded weight was 49 tons, making the total for engine and tender, in working order, 107 tons 14 cwt.

In performance the engines varied widely; sometimes they were quite good and at other times sluggish and disappointing. There can hardly be any doubt that the uncoupled driving wheels were at the root of the trouble. There might have been little cause for criticism if there had been some means of ensuring that the two driving axles would revolve constantly in a manner whereby the disturbing forces set up by the rotating and reciprocating masses were in opposition; but it frequently happened that the two axles revolved in phase, causing the forces to augment each other instead of cancelling one another out.

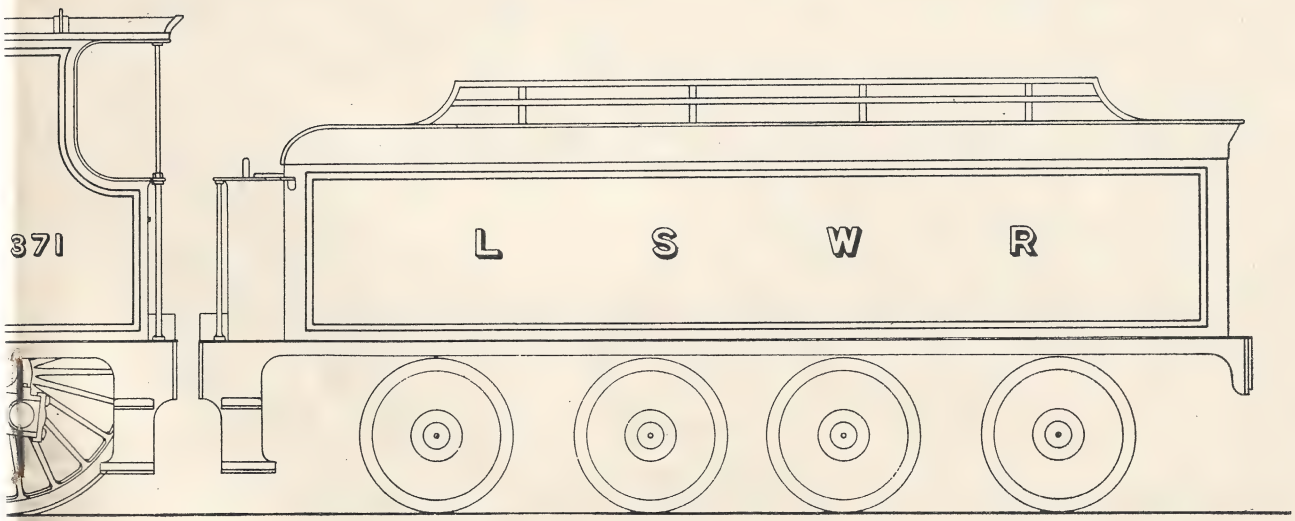
The result was considerable and often alarming oscillation. When this occurred, the driver's almost invariable reaction was to " check her a bit," which meant closing the regulator, applying the brakes to reduce speed to about 20-25 m.p.h., and then opening the regulator wide in the hope that one or other of the driving axles would slip itself out of phase. If it happened often, the time-keeping of the train suffered badly.

But Drummond was like F. W. Webb; he would not tolerate any criticism of his engines, and would use forceful and impolite language to drivers who ventured to complain. Small wonder, then, that most of the drivers would refuse to take an engine of this kind out if they could get others.

On the other hand, there were times when those two axles would revolve merrily for hours out of phase; and then the engines would run as well as the best, and everybody was happy. To a great extent, it depended on how long the engine had been at work since it was overhauled and had had the driving wheel diameters turned up.

As I have remarked more than once of some other engines, a model of of one of these curious locomotives would be extremely interesting.

★ *J. N. Maskelyne died before he had completed the drawing below.*



A GWR 2-6-2 tank engine of the 4500 class described in three gauges by MARTIN EVANS

Valve gear for the larger gauges

VALVE rods for the larger engines can be made rather more like their full-size counterparts; mild steel $\frac{3}{8}$ in. square will be needed.

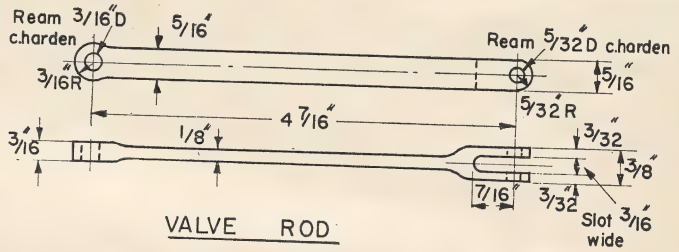
As is usual with this type of component, the holes should be drilled and reamed first, and then the $\frac{3}{16}$ in. slot cut with a face cutter mounted on a short arbor or between centres, and the bar clamped under the lathe toolholder at centre height. Reduce the other end to $\frac{3}{16}$ in. thickness, and the centre part of the rod to $\frac{1}{8}$ in., finally shaping the rod as shown in the elevation. Both the eyes can then be case-hardened, cleaned up, and polished.

The expansion link or quadrant is very similar to the $3\frac{1}{2}$ in. gauge component described fully on August 24, though with the larger size we can include properly shaped oil boxes for the two eccentric rod pin-holes. Gauge plate $\frac{1}{4}$ in. thick is the ideal material for the links; mild-steel case-hardened will also be quite satisfactory.

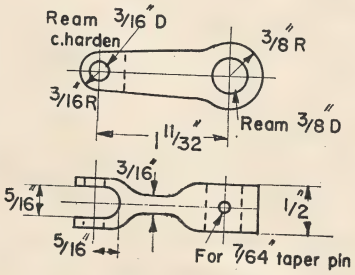
Make the link brackets like those for $\frac{3}{4}$ in. scale, except that $\frac{1}{8}$ in. iron rivets are advisable rather than 3/32 in. The lifting link pins are a press fit into the brackets, but as a very tight fit cannot be expected in the thickness of material (a bare $\frac{1}{16}$ in. at this point) you may resort to silver soldering. Afterwards clean up the inside of the bracket so as to allow a full $\frac{1}{16}$ in. clearance for the die-block pin.

The eccentric straps should be gun-metal castings. Use 4 BA screws to hold the two halves together. The front halves are tapped, and the rear ones are drilled No 27. If possible, the 4 BA screws should not be threaded right up to the head. If ordinary screws are used, it is difficult to get the halves of the eccentrics to line up exactly—essential for smooth running. For the eccentric rods we shall need bright mild steel bar about $\frac{5}{8}$ in. × $\frac{1}{2}$ in. or the nearest larger. Before making the forks, file or mill that end to $\frac{7}{16}$ in. thick, drill No 13, and then mill out the $\frac{1}{4}$ in. slot. As there is a good deal of metal to be removed to get the remainder of the rod down to $\frac{1}{8}$ in. thick, a hacksaw should be used, followed by milling or filing to reduce to $\frac{1}{8}$ in. thickness. Do not drill the strap end of the rods yet, but make up a jig, as I have described before, to ensure that all the rods are exactly the same length. The eyes of the eccentric rods must not be hardened as flush fitting pins are used and are a press fit. Use $\frac{1}{8}$ in. iron rivets to hold the straps to the rods; they are countersunk both sides.

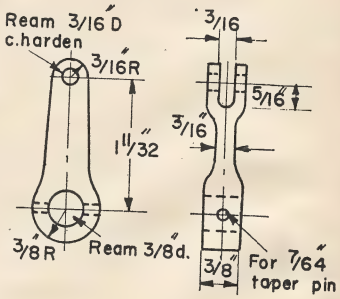
For the lifting links you need $\frac{1}{2}$ in. × $\frac{3}{8}$ in. bright mild steel. Both the holes are reamed $\frac{3}{16}$ in. dia., and are afterwards case-hardened and polished. The oil boxes can have $\frac{1}{8}$ in. dia. oil holes, with No 65 connecting holes into the bearings. While the boxes are not of very much practical value, they certainly improve the appearance of valve gear components.



VALVE ROD
2 OFF BMS



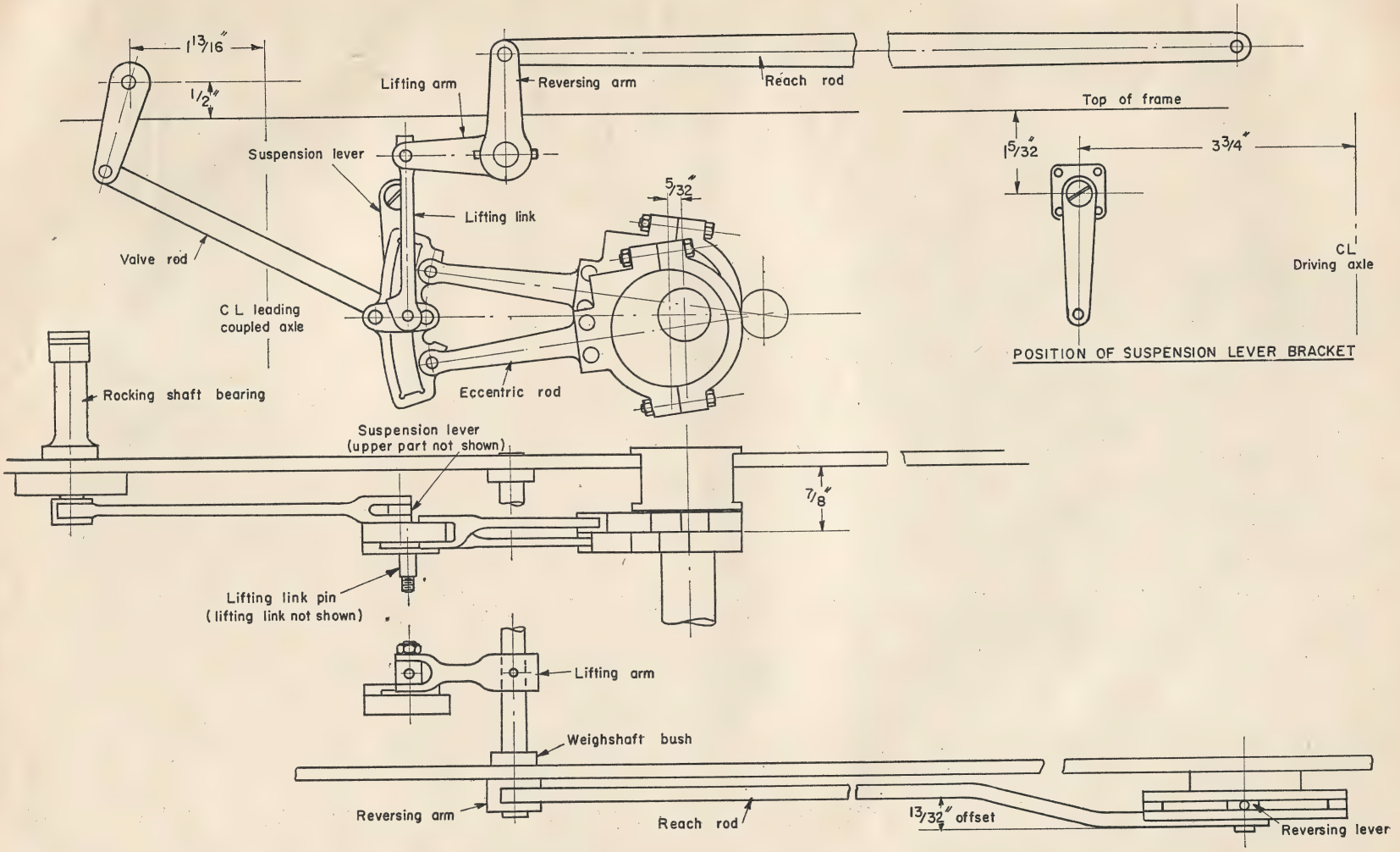
LIFTING ARM
2 OFF BMS



REVERSING ARM
2 OFF BMS

AN ME STAFF FEATURE

Continued from 24 August, pages 230 to 232



VALVE GEAR ASSEMBLY

The lifting arms are cut from $\frac{3}{4}$ in. × $\frac{1}{2}$ in. bright mild steel. Drill and ream the $\frac{3}{16}$ in. dia. holes, and then tackle the $\frac{3}{8}$ in. dia. holes through which the weighshaft will fit. As it is important to have the arms a nice push fit on the weighshaft, I would advise you to hold the blank in the four-jaw chuck, set it to run true, centre deeply in the required position, and drill out with a letter U drill. Put the lathe in backgear and carefully run a $\frac{3}{8}$ in. reamer through by pushing the tailstock bodily, and using plenty of cutting oil.

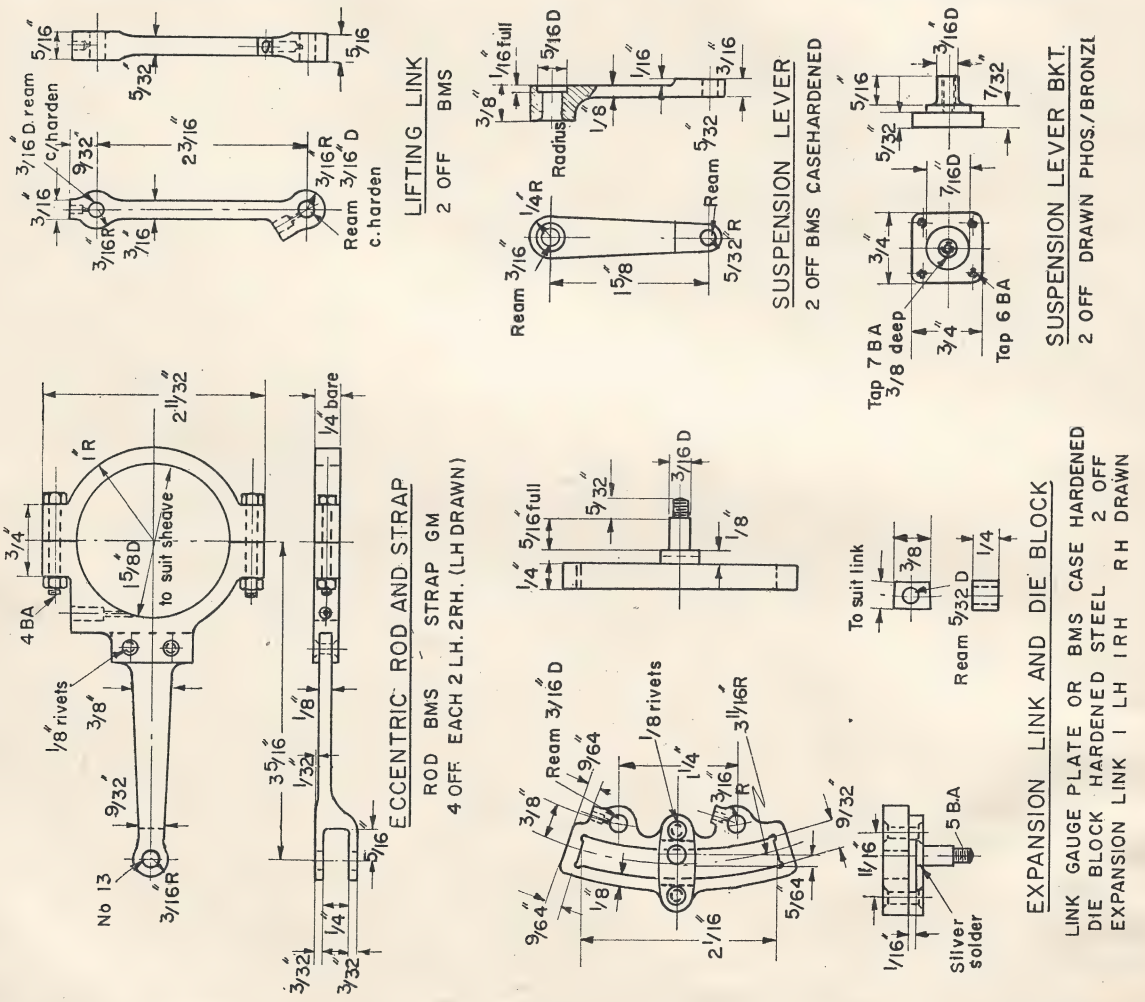
If the reamer is a little dull, it should give the right-sized hole. Should you have only a new and very sharp reamer, use a small boring tool instead. Take a series of very fine cuts, with the weighshaft itself as a gauge. The weighshaft is simply a $4\frac{13}{16}$ in. length of $\frac{3}{8}$ in. precision-ground mild steel. At this stage drill a No 48 hole in only one side of the boss, where the taper pin is to be fitted.

You can make the single reversing arm from a short piece of $\frac{3}{4}$ in. × $\frac{3}{8}$ in. bright mild steel. The smaller pin-hole here and in the two lifting arms are case-hardened and polished. Be very careful not to get any of the case-hardening compound into the $\frac{3}{8}$ in. dia. hole.

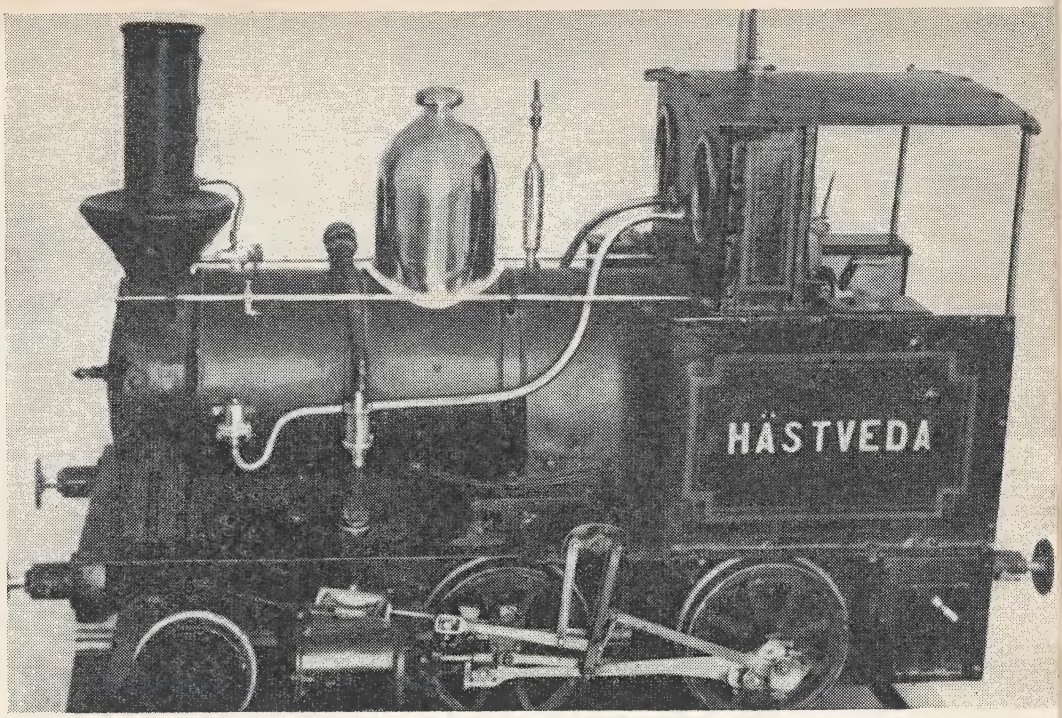
The suspension levers can be cut from $\frac{1}{2}$ in. square bright mild steel. First mill or file it down to $\frac{1}{2}$ in. × $\frac{7}{16}$ in. section. Then drill both holes with No 24 drill, and ream the lower one only 5/32 in. dia. Cut away the $\frac{1}{16}$ in. recess on the outside and the $\frac{1}{4}$ in. on the inside. Open out the upper hole with No 13 drill and ream $\frac{3}{16}$ in. diameter. Counterbore the hole on the outside $\frac{5}{16}$ in. dia. × $\frac{1}{16}$ in. deep. Radius the inside of the $\frac{9}{16}$ in. dia. as shown; finally shape the outside radii. Both eyes can be case-hardened.

Brackets for the suspension levers are made from drawn gun-metal bar $\frac{3}{4}$ in. square. If you have difficulty in getting it, you can again use mild steel, case-hardened. A piece is chucked in the four-jaw, set to run true, and turned down to $\frac{7}{16}$ in. dia. for a length of $\frac{3}{8}$ in. It is then turned down again to exactly $\frac{3}{16}$ in. dia. for a length of $\frac{5}{16}$ in., leaving a radius as shown. Centre, drill No 48, and tap 7 BA by $\frac{3}{8}$ in. deep.

● *Continued on page 305*



MIXED BAG



Per Johnsson's little engine now stands in the local museum

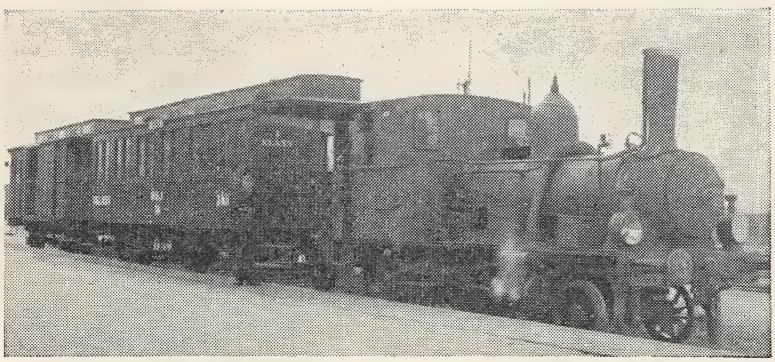
—and this reader found it

As a boy, I learnt of a model engineer in the late nineteenth century. He was Per Johnsson, a son of a farmer, and was born in 1823.

When the branch line which terminated in Hastreda was opened in 1887 Per became much interested in the little tank engine and decided to build a working model of it. The work took from four to five years of his spare time.

Folk came from all directions on Sundays to see the little engine in steam with Per driving it from a trolley. The track was about 20 yards long. An engineer had helped Per to make the injector and pressure gauge and showed him how to make working leafsprings, fitted properly in the bogies. The boiler pressure was about 60 p.s.i., and the engine weighed about 70 lb. While the right-hand injector worked, the left-hand was a dummy. A hand pump in the tank between the frames fed the boiler by the left-hand clackbox.

Per Johnsson died when he was only 34 years old, and an engine inspector in ship building. After many years of searching, I succeeded in finding the locomotive, which is now preserved in our home district museum in Hastreda, Sweden, where Per Johnsson and I grew up.—ALLAN ANDERSSON.



Down to earth

My first railway was a 3½ in. gauge on a raised track. This is quite satisfactory for riding, but is costly to erect and does not look very realistic. It also makes points impossible, and points are a part of the railway which have always been of great interest to me.

A train slowly winding its way through the points is, I think, a fascinating sight. When I decided to build a 5 in. gauge, my interest in

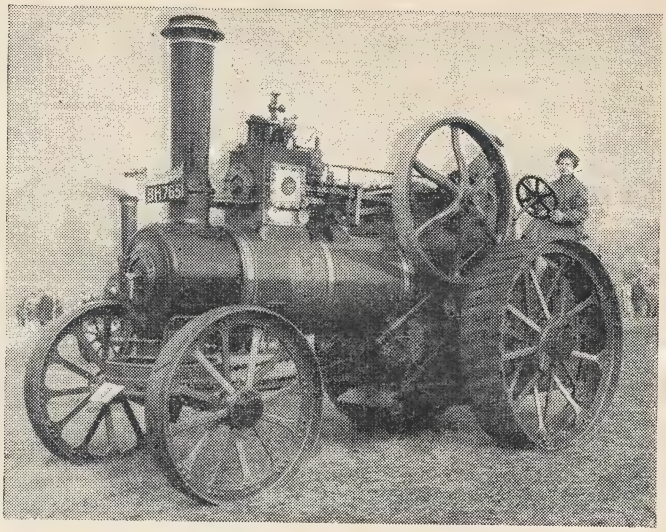
points, and my wish to have a railway that looked something like the real thing impelled me to put the track on the ground. The railway is surprisingly steady and much safer for the children. I can run around at a good speed.

The track is an oval 220 ft in length with two pairs of points and sidings. It is built partly from alloy Vignolles section rail, with the base drilled to take a round-head screw. The rest is $\frac{3}{8}$ in. square steel drilled right through and fixed with countersunk screws. I bent the steel around the garden roller, tucking one end under the handle; it bent quite easily.

My points are built from the alloy rail. I found the positioning of the frogs a bit tricky. The blades needed to be filed to a very fine point, and I found it necessary to put extra long check rails on the curves.

Points and signal work from the same lever; a piece of bar with two pins projecting. It slides between two side plates and is operated by a central lever. A point rod is inserted in each end.

The track is laid on concrete. In laying it I floated in a few pieces of sleeper wood $\frac{1}{2}$ in. × $\frac{3}{4}$ in. oak. An occasional screw holds the track firmly. The line was then ballasted with $\frac{1}{4}$ in. chippings. It has been in use for four years and, except for the replacement of a few sleepers, has given no trouble. Anyone in the Burnham-on-Sea area is welcome to try it out.—R. N. EDWARDS.



Beautiful beat

THIS Clayton and Shuttleworth traction engine was one of the proud locomotives which attended the Great Wymondley rally in Hertfordshire. Her name is *Valiant*.

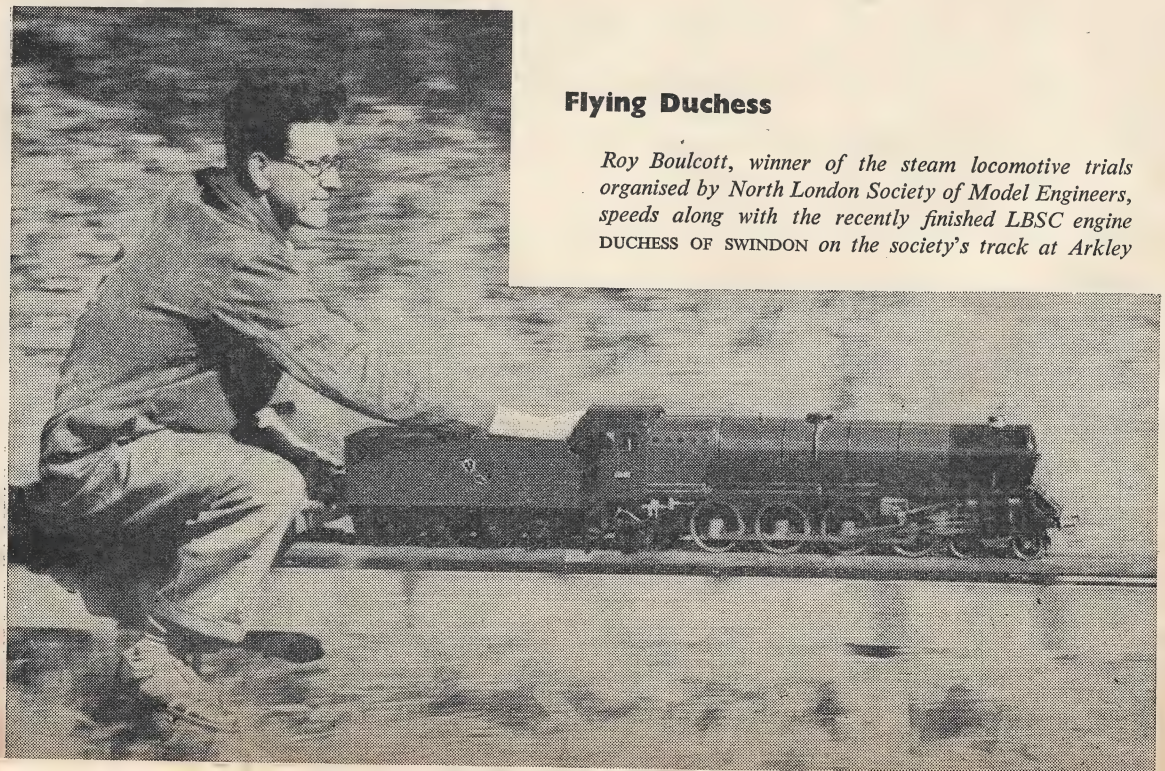
She is a late type, built in 1923, and is one of the last few turned out by that first-class Lincoln firm, which also made many threshing machines, considered like their engines, to be as good as any. They made a number of steam wagons as well.

The engine shown here has been stripped, thoroughly reconditioned, polished and repainted. Her condition and appearance are pretty well as when she was new. She is a 7 n.h.p. general purpose engine, with single cylinder and two speeds. Her weight is 10 tons, and working pressure 160 p.s.i. In all, she is a well thought out, compact and attractive design.

She has attended many rallies with success. At one rally the BBC chose *Valiant*, out of 33 engines, for a Town and Country recording. She broadcast as a soloist, for what attracted the broadcasters was her beautiful beat. She has also appeared twice on television.

Albert E. Deans of Baldock, who owns *Valiant*, also has three more beautifully re-conditioned engines.

—D.K.



Flying Duchess

Roy Boulcott, winner of the steam locomotive trials organised by North London Society of Model Engineers, speeds along with the recently finished LBSC engine DUCHESS OF SWINDON *on the society's track at Arkley*

CARDIFF MODELLER'S WORK IN CITY MUSEUM

J. J. CONSTABLE writes of Lionel Heath who for more than half a century has been studying the equipment used by contractors

AFTER reading in a recent issue of St Mellons MES Club News that one of the members, Mr L. I. Heath of Cardiff, had recently given some models to Cardiff Museum I went along to see them. They were not yet on display, but I was kindly shown them by Mr Morgan Rees, assistant keeper in charge of the new Department of Industry.

Mr Heath is a veteran model engineer with over 50 years' experience in making models. His collection consists entirely of 1/10 scale models of contractors' plant. He has built over 200 models and his collection is probably unique in Britain.

The models range from shovels and wheelbarrows to a three ton steam crane, complete with a separate navvy attachment, as built by Thomas Smith and Son of Rodley, Leeds. The rolling stock includes trucks and wagons of all types for standard and narrow gauge contractors' lines. There are various types of horse-drawn carts. Except for the professionally carved horses, all the details, including the detailed harness have been made by Mr Heath.

Standard and narrow gauge locomotives include *Kenya*, a Bagnall 0-4-0, *Kibbor*, a Hunslett 0-6-0, a Sentinel, a Montania narrow gauge petrol engine, and a Manning Wardle 0-6-0 at present under construction. Among the cranes, winches and pile-drivers is a 35 ft piling frame with a H. Sykes steam winch. Other models are of portable and stationary engines, mortar mills, concrete mixers, boilers, pumps, a compressor, a horsedrawn roller, and a Wallis and Steevens *Simplicity* roller not yet completed.

The only contractors' tool I could not find represented was the humble pick. I have no doubt that this omission will be rectified soon.

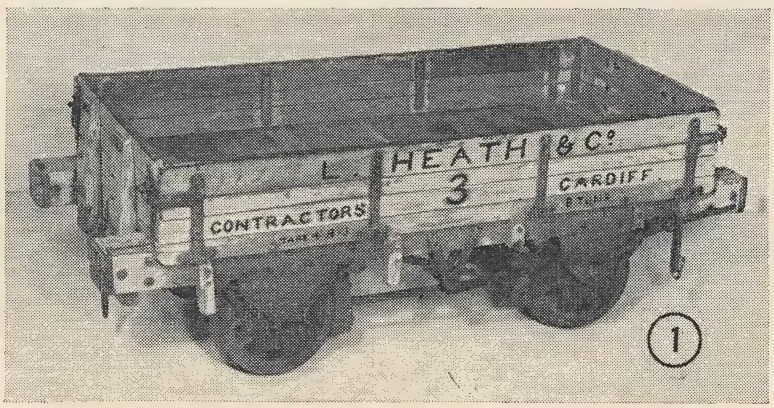
Photograph 1 shows a model of a standard gauge drop-side ballast truck of about 1870. Contractors usually called the main line wagons trucks to distinguish them from the rough wagons used on their temporary lines. The truck illustrated was in use on main line work up to about 1914. It was fitted with dead buffers and with a shackle and pin coupling. The drawbar was non-continuous, and each coupling had a box with a rubber pad to act as a drawbar spring. Canvas hoods protected the axleboxes from dirt. The brake blocks were made of hardwood, the underframes were of oak, and the body was of pine or another soft wood. A cream colour was adopted by Topham, Jones and Railton who did much work at Cardiff, Port Talbot and Swansea Docks.

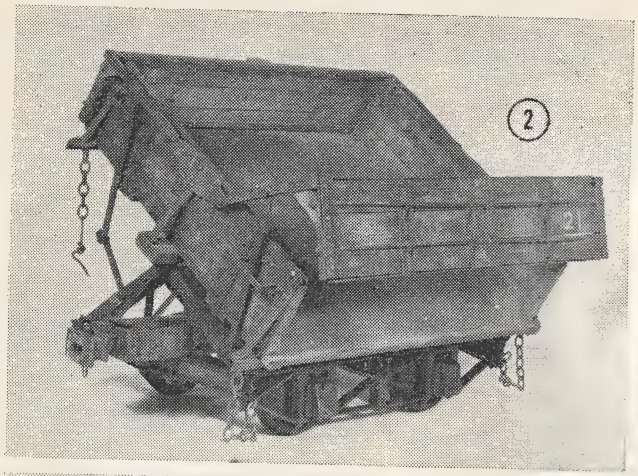
In Photograph 2 we see a standard gauge Canadian dump car. This truck, which could be tipped to either side, was made by the Canadian Wagon Works at Cardiff in about 1923 and was used by McAlpine and in the Oxfordshire iron ore quarries. It held six cubic yards. Generally the underframe was of steel, with a centre beam made from two lengths of good stout oak. The disc wheels were 2 ft in diameter. No brakes were fitted. The body was made from soft wood, and the floor was covered with sheet steel.

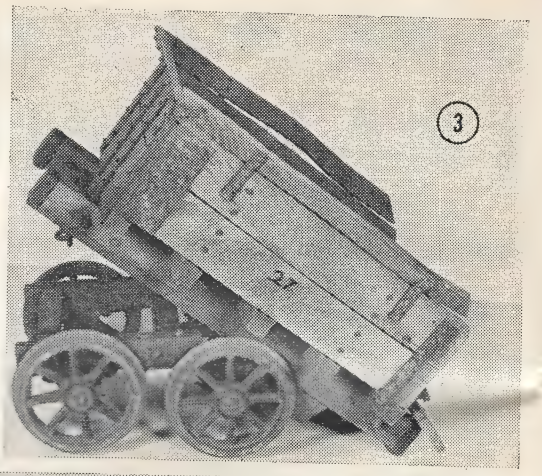
Photograph 3 is of a standard-gauge end-tip wagon. In one pattern, the Fiddlestick, the hind wheels leave the bearing when the wagon is tipped; they are kept equidistant from the leading wheels by a light frame called "fiddlesticks." The design illustrated is known as the Joint Frame; a joint or hinge is formed in the bearing of the heavy end-wheels on the lower frame. Contractors' men preferred joint frame wagons if the muck was sticky, as the wagon was less likely to turn over when it was tipped. The fiddlestick was preferred in good conditions.

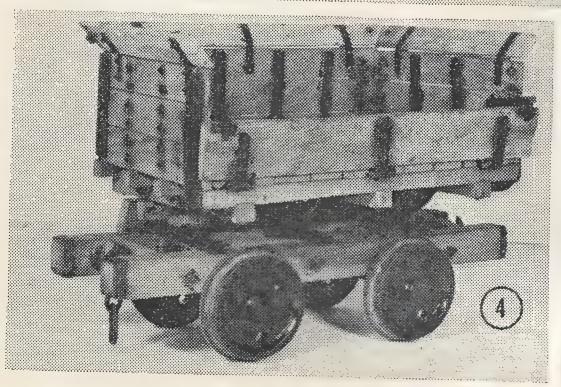
Such wagons were usually tipped by being fly-shunted by a light engine or by a horse with a special harness known as a spring bar. The wagon ran over the ends of the rails with the leading wheels dropping into a bumper hole formed of hardwood planks about the size of railway sleepers. The planks were laid to form a U-shaped depression. As work progressed, other planks, provided with grooves for the wheel flanges and known as runners, were placed between the rail ends and the bumper hole until enough length had been tipped to add a short length of rail (about 6 ft) to the track. The groove in the runners guided the wheels back to the rail. Runners and bumpers were often provided with lifting handles at each end.

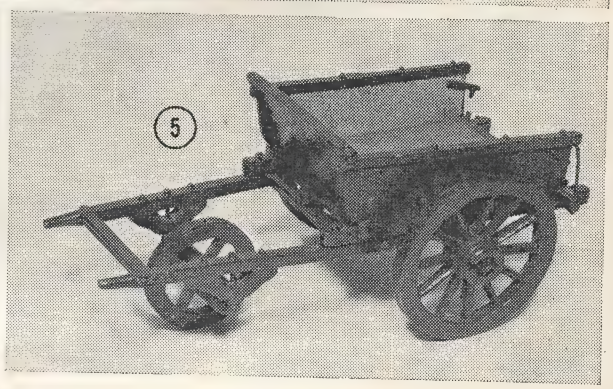
Usually the wagons were made entirely of elm; occasionally the underframe was of oak. They were often made by the contractors themselves. Collar boards were not provided unless a steam navvy was used for loading.











The 2 ft 6 in. wheels are pressed on axles which run in cast iron bearings. A gooseneck coupling with three links is bolted through each solebar as shown, and the two ends of the links are joined with a ring. As the wagons always ran in one direction, a coupling hook was fitted only to the ring at one end.

The model was made from a derelict wagon seen at Edge Hill, Warwickshire, in 1938. It was of elm. All joints are morticed and tenoned. The steel bolts and fastenings can be seen.

Photograph 4 shows a model of a narrow-gauge tip wagon—the Manchester Ship Canal wagon, commonly used by railway contractors throughout the country and at work in South Wales up to 1951. The wood was usually elm or oak, or a combination of both.

There were three rockers of hardwood faced with channel iron. The channel rested and rocked, or tipped, on a short length of bridge section rail. Sometimes the wagons built for standard gauge had wheels taken from old railway trucks.

Two-foot wheels were used on the 3 ft gauge wagon illustrated. The couplings are the patent developed by the Cambrian Wagon Company, and are similar to main-line ones. Gooseneck couplings were also used on the wagon built for standard gauge, but a hook was provided at each end.

Many dobbin carts, like the one in Photograph 5, played an important part in the construction of Cardiff's famous Civic Centre, which includes the museum where the models now rest. The cart was used by contractors on railway work where the lead from cutting to tip was short, and also for all earth-shifting jobs. The *Engineer* of November 1895 mentions their use by the Gloucester County Council. The remains of two such carts were seen in 1949 in a quarry between Chipping Campden and Broadway.

The capacity of the cart was about three-quarters of a cubic yard. One horse was used except where the incline was steep. When the cart was loaded, the horse was hitched to the tailboard end and the driver caught hold of the shafts at the other end to lift or skid the small wheel in rounding a sharp curve. The horse walked over the end of the tip, and was unhitched, and then the tailboard was removed and the cart tipped. During this time the horse walked round to the shaft end. After it was hitched on it pulled the cart back to the place of loading. Meanwhile another dobbin cart had been loaded and was ready for horse and driver to take back to the tip.

Specialised firms and local wheelwrights made the bodies of elm or poplar with ash shafts, and underframes of oak and ash. The main wheels were 3 ft 6 in. to 3 ft 9 in., and the small ones 2 ft 3 in. They had elm hubs and felloes. Split oak was used for the spokes, as sawn timber would not have been so strong; the saw cut might not have followed the grain. The stub axles for the large wheels were fitted in beech axletrees.

The dobbin carts used at Cardiff during the building of the Civic Centre were painted blue all over; the models were merely tarred. ▣

[*Lionel Heath is now in his late sixties. Writing of him in* ME *of* 18 *October* 1956, *Joseph Martin revealed that he first became interested in contractor's equipment as a boy when he watched the building of Cardiff City Hall.*]

READERS' QUERIES

DO NOT FORGET THE QUERY COUPON ON THE LAST PAGE OF THIS ISSUE

This free advice service is open to all readers. Queries must be within the scope of this journal and restricted to one problem. The replies published are extracts from fuller replies sent through the post: queries must not be sent with any other communications: valuations of models, or advice on selling cannot be given: stamped addressed envelope with each query. Mark envelope clearly "Query," Model Engineer, 19-20 Noel Street, London W1.

Markings on telescope

I have a prismatic monocular telescope made by Offway of London. I wish to strip it, make a very light one for the optics, use the cone as a camera long focus lens.

The centre lens seems to be attached to the two prisms with a cross graticule and small figures showing between lens and prism.

Can I remove the markings if the lens is only glued to the prism? It looks rather as if they may be etched on the lens itself.—M.E.J., Westgate-on-Sea, Kent.

▲ *The lens is presumably cemented to the prism by Caroda balsam which can be softened by heat, but its removal might be rather risky unless you have a great deal of experience with handling optical parts.*

It is also very likely that the graticule is actually engraved on the surface of either the lens or the prism, so that separating these parts would not be of any advantage. For further advice Messrs Ottway, Northway Avenue, London W13, should be consulted.

Lathe accuracy

I am considering the purchase of a new EW 2½ in. × 10 in. screwcutting lathe. I am not a member of any model engineering society and have no experience of the EW. Consequently I do not know the lathe's capabilities or failings.

Several years ago I bought a small 1⅜ in. centres × 6 in. lathe and to list its failings would take considerable space. It was absolutely useless for anything accurate.

I am looking for a lathe on which I can machine small diesel engine components and parts for small gauge steam locomotives (O and 1 gauges), where the call will be for accurate small parts.

Any comments or information you could give on the EW 2½ in. × 10 in. screwcutting lathe would be greatly appreciated.—N.J.O., Leicester.

▲ *An EW lathe has been used in the ME workshop and has been found to be a sound and practical tool.*

ME has published several articles on improvements and attachments for the EW, and there is no doubt that many readers have been able to apply the lathe very successfully to accurate work. But it should be remembered that light and relatively inexpensive lathes have definite limits which must be accepted. High precision is always an expensive luxury, and although the EW lathe is excellent value for money, it is possible that some slight adjustment to it may be necessary if it is required to turn out work of very high accuracy.

Perpetual motion

Can you tell me if anybody has succeeded in building a perpetual motion machine of any kind? Have any books been published on the subject? I am a regular reader.—T.J.G., Army Dental Centre, Osnabruck.

▲ *Articles on some ingenious so-called "perpetual motion machine" have been published in ME, and were published in* English Mechanics *during the nineteenth century. The editor of* Mechanics *long ago pointed out that any serious attempt to achieve perpetual motion was a waste of time and thought.*

So far as can be ascertained, no perpetual motion machine of any kind has ever been constructed. Although there are many stories about machines of this type, none of them is properly authenticated.

Most engineers and physicists would agree that perpetual motion in the sense normally understood would be impossible, though there is always the possibility of utilising forces of nature which would keep the machine running for an indefinite and possibly infinite length of time.

George Adams lathe

I have recently obtained second-hand a 5½ in. × 30 in. George Adams lathe which has a 12 t.p.i. leadscrew. The screw is unusual because of the thread pitch and also because there is just a conventional screw thread.

I should be glad of any information on the gears required for cutting British and metric threads, and on their arrangement.

At the same time I should like to enquire whether you publish any books on the lathe.

May I say how much I like the new series "Locomotives I Have Known"?—M.L.B., Dauntsey's School, Devizes.

▲ *This lathe has been out of production for many years now.*

You do not state whether you have the set of change wheels but if so, screw cutting trains can be worked out by simple arithmetic, the pitch of the thread being decided between ratio of the mandrel speed, and the pitch of the leadscrew. In other words, if the mandrel and leadscrew speeds are equal, the pitch of thread produced will be 12 t.p.i., and all other pitches can be worked out on a proportionate basis.

PM Books Department can supply Lathe Accessories (5*s. plus* 4*d. postage*), Beginner's Guide to the Lathe (5*s.*, 4*d. postage*), Practical Lessons in Metal Turning and Screwcutting (6*s.*, 8*d. postage*) *and* Lathe Manual (15*s.*, 1*s.* 2*d. postage*).

Steam Wankel

I would very much like some information on the recently-developed Wankel-NSU rotary engine, or on the principles governing its operation. I am much interested in constructing a steam-operated conversion of such a unit, as I believe that the Wankel arrangement is better adapted to use steam of very high temperatures than is the conventional reciprocating engine.

My principal problems are the actual process of drawing out a correctly proportioned rotor and stator unit.—K.N., Edinburgh, **9.**

▲ *To operate the Wankel NSU engine on steam would be quite practicable, though whether it would be more efficient than the conventional type of reciprocating engine is a matter which can be decided only by experiment.*

The development of the contour of both the rotor and stator is rather difficult, though it could be done by the application of geometrical principles. However, it is one thing to lay down the correct shape and quite another to machine it correctly.

Undoubtedly the sealing of the end

and sides of the rotor is one of the major problems. In the actual engine, the rings are apparently not sprung, but are kept in contact with the walls of the stator by gas pressure. Good quality cast iron would be highly satisfactory for both the rotor and stator for use with superheated steam. Stainless steel would not be suitable as, apart from machining difficulties, it is rather treacherous material when used for bearing surfaces.

As you suggest, a ratio of 2 to 3 must be used in the gearing between the rotor and the main shaft. Presumably you are aware that an article on this engine was published in ME for 8 September 1960 (obtainable from PM Sales Department at 1s. 4d.).

Boiler for boat

I propose building an internal flue boiler for a model boat, the barrel of which is 8 in. long × 4 in. dia. and the flue 2 in. dia. Could you please tell me the most effective arrangement and sizes of the cross tubes ?

The engine is $\frac{5}{8}$ in. bore × $\frac{1}{2}$ in. stroke, double acting. Is there any way of telling if the 4 in. copper tube is seamless, and if it has a seam, is it suitable for the boiler ?—A.A., Sunderland.

▲ *The cross tube for an internal flue boiler with a 2 in. flue might be $\frac{3}{8}$ in. dia., arranged vertically or obliquely (not horizontally) across the flue and spaced about $\frac{1}{2}$ in. apart.*

There is generally some visible indication of the seam. If the metal is polished and then left a day or two, the seam tends to become slightly tarnished. There is no objection to the use of a tube with a brazed seam, so long as it is quite sound and stands up to a hydraulic test. About six tubes should be sufficient.

Electronic organ

I am building an electronic organ, using wheels for the fundamental tone generators. I find the type of bearing I am using (similar to lathe centres) is difficult to keep greased for any length of time, and consequently it becomes too noisy.

Could you please recommend a suitable oiling system, or a type of bearing for each spindle (12 in all) running at an average speed of about 1,500 r.p.m., which would be silent while running, and at the same time require the minimum of attention for oiling ?—P.C.H., Whitstable, Kent.

▲ *For the phonic wheel spindle of your electric organ, the self-lubricating sintered bronze bushes would probably be the best as they would give complete silence in running, if properly fitted, and would eliminate any possible trouble through lack of lubrication.*

They would create little, if any, more friction than point centre bearings which are always difficult to keep lubricated, and would not produce the noise which is often caused by ball races. You could write to The Manganese Bronze and Brass Co. Ltd, Ipswich; Morgan Crucible Co. Ltd, Battersea Church Road, London SW11; and Sintered Metal Components Ltd, Chard, Somerset.

Beginner in Pretoria

I have just started model engineering and have completed a 10/V and Double 10 Stuart engine.

I find it a most interesting pastime, and I see in ME that there are many firms which advertise castings and materials for locomotives and other engines.

I would appreciate some advice from you on slightly more advanced engines which I could carry on with, and also on the firms which I could write to, as there are no firms here which sell or import materials and castings for model engines.

I am a fitter and turner and have all the machines required to tackle most of the models discussed in your most interesting magazine which I read every week.—N.P., Hercules, Pretoria, South Africa.

▲ *PM Plans Service supply designs for nearly all types of models and small working model engines. The Plans Catalogue, which is being sent to you, gives particulars of these models.*

Without knowing your specific choice it is impossible to advise you definitely on the firms which supply castings and parts for these engines. Given further information ME will try to put you in touch with the firms supplying castings.

School course

We give a three-year technical course at this school, and as we are having a new school built we will be able to enlarge our activities.

Can you recommend a book or books on casting ? To begin, we will be using aluminium, and brass, but we hope to progress !

I can recollect articles in ME, but I am too busy just now and my old copies are too scattered to allow me to hunt back.—R.A.R., Avoch, Rosshire, Scotland.

▲ *Terry Aspin's* Foundrywork for the Amateur (*PM Books, 5s., postage 4d.*) *gives full details of the methods, materials and processes employed in making castings in non-ferrous and ferrous metals, together with information on the design and construction of furnaces of a type suitable for small scale work.*

M.E. Exhibition Results

Continued from page 291

CLASS Q

SCENIC AND REPRESENTATIONAL

Silver Medal and Claude B. Reeve Prize—**H. Joyce** (London N16), St Mary's Church, Stoke Newington.

CLASS R

HOROLOGICAL, SCIENTIFIC AND OPTICAL APPARATUS

Silver Medal and Bradbury-Winter Memorial Cup—**C. W. Jowett** (Ilkley, Yorks), grandmother perpetual calendar clock.

Bronze Medal—**P. R. Berry** (Wednesbury, Staffs), the Sparey microscope.

VHC—**J. H. Wilding** (Billingshurst, Sussex), electric clock; **A. E. Bowyer-Lowe** (Letchworth Herts), colour slide projector,

HC—**H. H. Earl** (Hornchurch, Essex), orrery.

CLASS S

GENERAL CRAFTSMANSHIP

Bronze Medal—**H. V. Yeatman** (Purley, Surrey), chessmen.

VHC—**W. C. Holbird** (Grays, Essex), diver's helmet.

HC—**J. Kirtley** (Southwick, Sunderland), footwear models.

C—**R. Cocks** (Worcester Park, Surrey), Kitchin rudder.

CLASS T

JUNIOR SECTION

Silver Medal—**A. D. Bomback** (North Harrow, Middlesex), HMS *Blackpool*, and *Hilary* Q ship.

C—**B. Turner** (Rochester), U-boat in balsa wood.

STUDENTS' CUP

Collective Cup—**British Railways Apprentice Training School, Crewe,** Lancashire and Yorkshire Aspinall 4-4-2 locomotive.

Individual Cup—**D. I. Rowland** (Farnham, Surrey), Clyde Puffer *Sealight*.

VHC—**Green and Silley Weir School** (London E16), freelance Pacific locomotive and adjustable taper gauge.

HC—**British Railways Apprentice Training School, Crewe,** Bo-Bo diesel locomotive.

C—**Greenwood Bi-Lateral School** (Nottingham), Stuart lightweight petrol engine.

SCHOOLS' COMPETITION

VHC—**Greenwood Bi-Lateral School Engineering Society** (Nottingham), Stuart beam engine. (Prize won by default.)

CLUB TEAM CUPS

Model Engineer Ship Model Societies' Challenge Trophy—**Wembley Ship Model Society.**

ME Club Team Cup—**SMEE.**

Model Aircraft Cup—**Vickers-Armstrongs Model Club.**

POSTBAG

The Editor welcomes letters for these columns. A PM Book Voucher for 10s. 6d. will be paid for each picture printed. Letters may be condensed or edited

STEPPING MOTORS

SIR,—After reading the article by Raymond Stock on August 3 "How Stepping Motors Work," I must correct a statement that he makes re the geometry of stepping motors.

"It will be noted that such devices never move their ratchet wheel directly by magnetic attraction." Mr Stock makes this statement just before he advises his readers to study a PO selector.

I will agree that the present four standard PO Uniselector act on the return movement, but all the present standard two motion switches used in the BPO operate their ratchets directly from the electromagnet. There is also a number of ex-Government Uniselectors and ratchet relays on the market which operate in the same direct manner. I agree that the jamming action is needed for use with a differential, but it can also be obtained on forward operation of the ratchet mechanism.

All the two-motion selectors that have been installed in the GPO International Telex exchange, including those used for Continental subscriber dialling, operate on the forward movement of the electromagnet.

It may be of interest that this exchange, the largest unit of its kind in the world, is situated in the Fleet Building on the site of the old Percival Marshall offices in Farringdon Street. The Fleet unit serves the whole of the London and Home Counties directly and provides a switching centre for people in the British Isles to dial their numbers in Western Europe direct. It handles about 500,000 calls a week.

Sidcup, Kent. J. H. KING.

OLD HANDBOOK

SIR,—I am sending MODEL ENGINEER the old PM Handbook *Model Boiler-Making* by E. L. Pearse. If I come across any other old PM publications I will send them as well.

I do not know why Central Hall was chosen for this year's Exhibition, but I hope that future ones will be held in the old place where the old atmosphere prevails and there is room for the usual trade stands.

However, I saw some beautiful craftmanship at Central Hall last Wednesday, and I would like to express my appreciation to the organisers of the Exhibition.

Sidcup, Kent. J. E. PERRY.

[*Thank you, Mr Perry, for the old Percival Marshall Handbook, which we are always pleased to receive, and if not of value in our library, can be passed to the right quarter.*—EDITOR.]

COLLIERY WHEELS

SIR,—During a recent coach journey a boy on the seat in front of me asked his companion (presumably his father) how large the wheels on the heapstead head were at a colliery we were passing.

I was rather amused at the reply: "Oh, five or six feet." This would probably be the answer that many would give. Admittedly, the wheels look quite small up there.

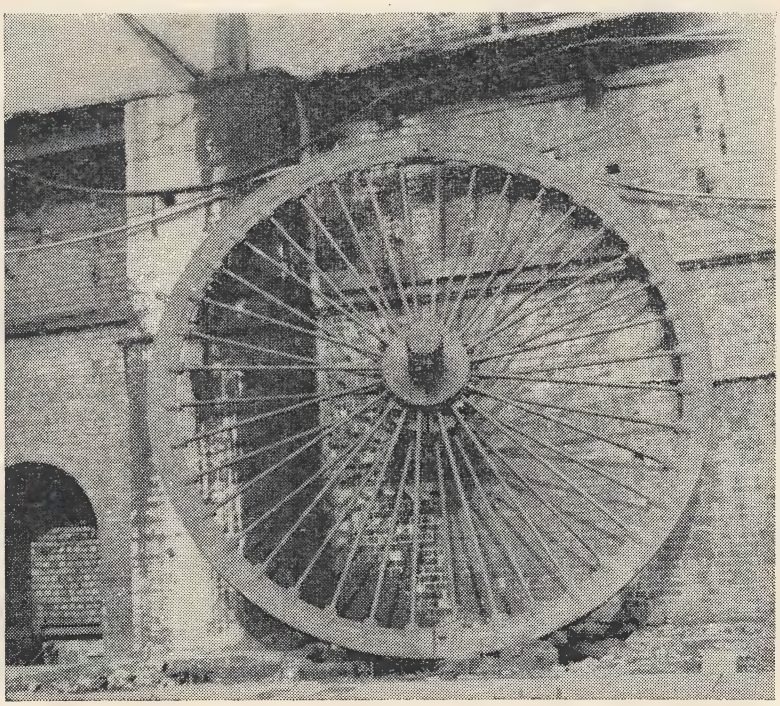
My photograph shows a spare wheel lying at a colliery. Its diameter is 18 ft, and it has 40 spokes 2 in. diameter. The diameter may be roughly checked against the brick work (seven courses of bricks make roughly 2 ft).

The wheels are cast in halves with the rim joints cottered. The hubs are bolt-clamped to the shaft. A ring is shrunk on either side of the boss. The spokes are cast into the rim and hub.

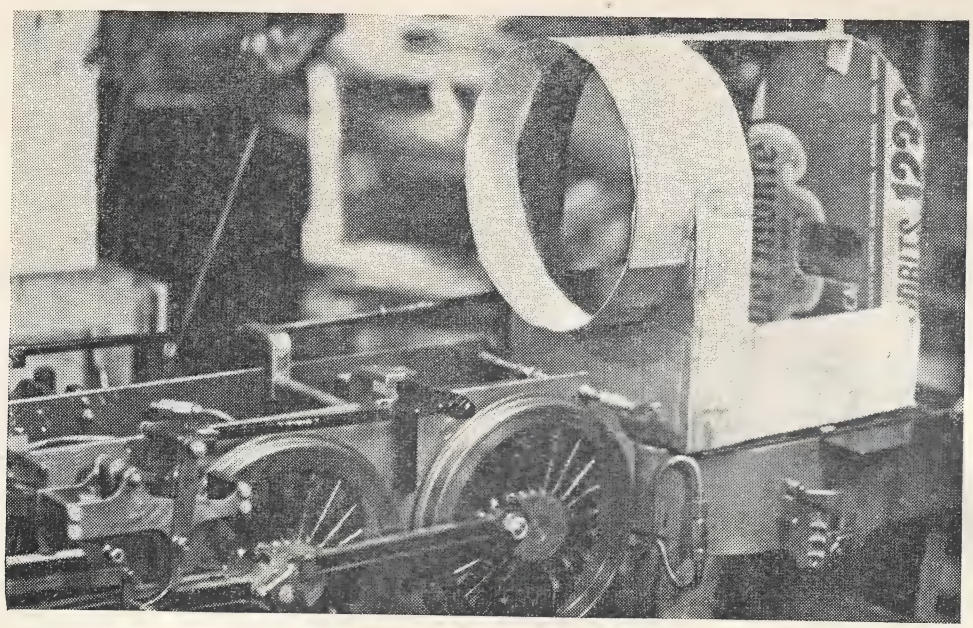
I would be interested to hear of a model wheel constructed in this way.

Newcastle-on-Tyne. E. H. JEYNES.

[*A heapstead is the buildings and surface works around a colliery shaft.*—EDITOR.]



From a distance, the wheels on a colliery overhead gear look quite small. Here is one of them on the ground; it measures 18 ft in diameter



Before building a BANTAM COCK *scaled up from the $\frac{3}{4}$ in. to the 1 in. size, Fred Massey, the Canadian modeller, produced a mock-up of the boiler from cardboard*

SCALING UP

SIR,—There is an undoubted trend towards larger engines. Perhaps this has come about through better tracks, where sustained runs and heavy loads require something more than a $3\frac{1}{2}$ in. gauge engine for a real job of work.

With a wealth of designs for $3\frac{1}{2}$ in. gauge, many will consider taking these plans and enlarging everything to the 1 in. scale. Usually it is done by multiplying dimensions everywhere (where reasonable) by four-thirds. This is what I have just done in producing a *Bantam Cock* chassis in 1 in. scale.

But a 1 in. scale engine can bring some surprises. For instance, a rough estimate of the weight of a 1 in. scale *Bantam Cock* is arrived at as follows:

Weight of $\frac{3}{4}$ in. scale *Bantam Cock* = 70 lb.

Weight of proportionate 1 in. scale = $70 \times 4/3 \times 4/3 \times 4/3 = 174$ lb.

Having completed the chassis, which I can barely lift, I can certainly vouch for the good reasoning in this formula. Now I am worried about the boiler and have given considerable thought to the provision of enough steam for cylinders $1\frac{5}{8}$ in. dia., having large passenger loads on our 725 ft continuous track.

In scaling up the boiler by the 4/3 × 4/3 × 4/3 formula, I feel that we are liable to come unstuck. The temperature of the fire will not be proportionately increased. Neither will a fire which is proportionately wider, longer and deeper, give the desired result in producing proportionately enough heat. As a matter of fact a 4/3 deeper fire might even run cooler. How will we take care of this ?

The only answer is to increase the grate area by the third factor. We also have an opportunity to increase the area of the firebox heating surfaces by modifications of the design. *Bantam Cock* in $\frac{3}{4}$ in. scale has a grate area of about 12 sq. in. With a white hot fire the engine performs beautifully and will easily pull six or seven passengers at high speed on our continuous track. The three-way scaling applied to the area of the grate, gives us a figure of $28\frac{1}{2}$ sq. in. for the new grate area. To get the area, we must lengthen the rear cradle about 2 in. I did this, and the new grate measures out to 30 sq. in.

The original *Bantam Cock* has a sloping backhead. By making the backhead vertical, we can add another extra few square inches to the firebox crown sheet and the heating surfaces leading up to it. I estimate that about 20 sq. in. above the result of scaling-up will be gained here.

Along these lines I prepared sketches for the new boiler. But being a cautious soul, from experience and the school of hard knocks, I felt that a cardboard mock-up of the firebox end of the boiler might be instructive; and I was also curious to see how big the projected new boiler would work out.

I would strongly advise anyone in similar circumstances to spend half an hour making such a mock-up. I found that further modifications were necessary after looking at the way that the cardboard model fitted. A big boiler is not a matter to be taken lightly, and having regard to the price of copper, and to the effort of making even a $3\frac{1}{2}$ in. engine boiler, the cardboard mock-up would seem to be absolutely essential to get everything in proper perspective

Rothesay, FRED MASSEY.
New Brunswick.

FRENCH PORTABLES

SIR,—I have read with interest Mr H. H. Nicholl's letter [Postbag, August 10] on French portables.

I do not know on what grounds Mr Nicholls bases his statement that this engine could not have been built for the purpose in which it was engaged. From what I saw of the sanitation system of Port Said at that time, I should think that there was scope for the continuous use of such an outfit in certain parts of the town; and this was obviously an outfit owned by a public sanitary authority. The air pump had no appearance of ever having been a water pump.

I do not know why Frenchmen should be supposed to be ignorant of the use of the steam jet. Giffard was a Frenchman.

I am not quite clear how Mr Nicholls would propose to use his ejector. In the example which he gives, the sewage was apparently passed through the ejector—a messy job, especially as the sewage would

probably be warmed by the condensation of steam ! If he proposes to use the ejector merely to produce the vacuum otherwise produced by the air pump, is he sure that he would not require more steam to do this than with the air pump ? He would have a good deal of air to shift especially during the last stages when the suction pipe was beginning to draw air.

I have always regarded the steam ejector as a wonderfully simple method of creating a vacuum and quite efficient in certain circumstances but not all. It is employed to create a vacuum in the standard vacuum brake, but in Swindon's own version of the brake—which used a higher vacuum than standard and which was generally accepted, I believe, as being better—the ejector was supplemented by a crosshead-driven air pump. The Frenchmen were not such fools after all !

Traction engines were, of course, much used in the First World War, as the internal combustion tractor had not reached the stage it was at in World War II.

Most of the engines would almost certainly be British, though the two French firms mentioned in my article also made traction engines, and Pecards of Navers made them as well. I believe that a few American engines were imported. It is quite possible that Italy built some as well. At Gallipoli we had little use for them, though two Fowler ploughing engines were landed on " W " Beach. Only one of these was used, and that one only a few times; I believe that the second engine was never completely assembled.

Norwich. GEOFFREY K. KING.

HMS ALBION

SIR,—I was gratified to read the letter from H. C. Bateman in Postbag of August 10. This is the kind of letter which promotes knowledge.

But I think that Mr Bateman is in error with regard to *Albion*. I have before me, as I write, the Navy List for 1901 which gives the following: *Albion*, 1st class battleship, 12,950 tons, h.p. 13,500, complement 700 men, speed 18¼ knots. Flagship China Squadron. Rear Adml Harry T. Grenfell. Thames Ironworks 1898."

It would seem, therefore, that she was not built in 1906 as Mr Bateman says. Moreover, in my last article I mentioned that in my early days I worked with one or two men from certain Thames-side yards, and I have heard many times that when *Albion* was launched its backwash caused a grandstand erected for the launching to collapse, with much loss of life. One of my informants, a Thames Ironworks apprentice, helped in the rescue work.

Capt E. Smith in his monumental *A Short History of Naval and Marine Engineering* (CUP, 1938) gives Maudslays as her engine builders; as they did not close until 1900, this is quite possible. On page 63 he gives Penns as the builders of the engines for the *Chatham*.

Mr Bateman mentions the car. This, I think, was a 50 h.p. model and was introduced at Penns to find employment in the latter years. It remained in production until the close in 1913.

May I again thank Mr Bateman for an interesting letter ? I wonder if he remembers Bill Postgate, S. Alston, or Bert Blundon ?

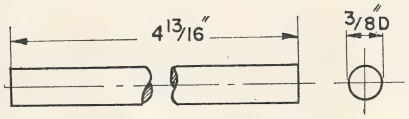
Twyford Mill, GEORGE WOODCOCK.
Hertfordshire.

FIREFLY . . .

Continued from page 296

I am showing the correct position of the bracket inside the frames in relation to their top edge and to the centre-line of the driving axle. Those who have followed the frame drawing exactly will find that they have a ⅛ in. dia. hole exactly ⅛ in. forward of this position. It was originally intended to help in lining up the suspension lever bracket, but on completing the valve gear I find that the ideal position for the centre of the bracket is ⅛ in. to the rear.

The hole will still help to locate the bracket without in any way affecting its fitting to the frame. Scribe a longitudinal centre-line across the back of each bracket, and a vertical line ⅛ in. *ahead* of the true centre. Then the intersection of the two lines can be spotted through the ⅛ in. holes in the mainframe. Drill four No 34 holes in the frame, making countersinks in the bracket (it will be necessary to drop the leading coupled wheels a little, to get the drill into position). Remove the brackets and tap 6 BA. Countersink the holes in the frame, and tackle the two retaining screws which hold the suspension levers on their brackets. These are 7 BA but have a head turned to a shade under 5/16 in. dia. and 1/16 in. thick.



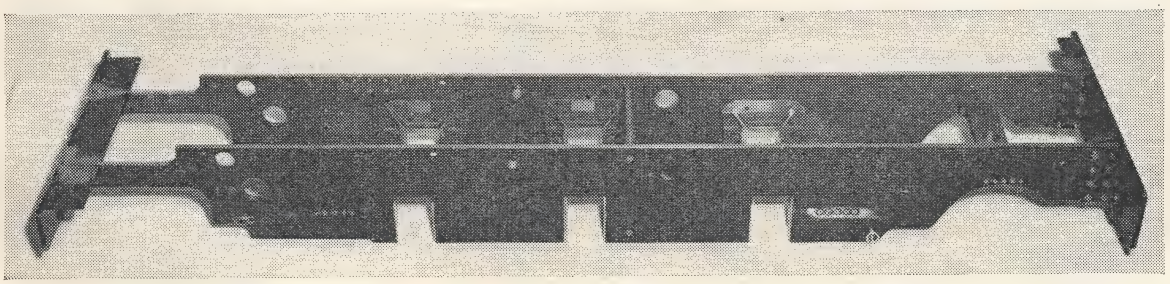
WEIGHSHAFT

1 OFF GROUND MS OR SILVER STEEL

Case-harden the heads only. To do this without damaging the thread, get a length of mild steel rod about 3/16 in. dia., and tap one end 7 BA by about ⅜ in. deep. Put the screws in right up to the head. You can use the rod to hold the screw while you are case-hardening.

In the next article, we will deal with the lever reversing gear, the assembly of the valve gear, and the setting of the valves.

★ *To be continued on September* 21



Mainframes of the 5 in. gauge model

CLUB NEWS

Send news and notices to The CLUBMAN, 19-20 Noel Street, London W1

VISITORS TO BRIGHOUSE

FRIENDS from Brighouse spent a pleasant day's steaming on the Rochdale SMEE track at Springfield Park recently. Visitors with their locomotives included Mr D. W. Horsfall (5 in. gauge 4-6-0 class 5), Mr H. Byrom (5 in. 0-4-0 freelance *Wagtail*), and Mr G. H. Wood (3½ in. rebuilt Scot *Seaforth Highlander*).

The Rochdale locomotives were the 4-6-0 LMS 5F5P of Mr W. F. Jackson and the 3½ in. gauge *Duchess of Buccleuch* owned by Mr D. Woolfenden.

From October 6-8 the Rochdale society will be holding its exhibition at the Youth Centre, Smith Street, Rochdale. Entry forms and details may be had from the secretary, Mr E. Hinchcliffe, 18 Verdun Crescent, Rochdale.

FIRE AT CREWE

I was very sorry to hear from Mr H. Dean, secretary of the Crewe MES, that the exhibition which members had planned to hold in the Corn Exchange has had to be cancelled because of the disastrous fire which the building suffered early in August.

ROTTERDAM SPECIAL

The Railway Enthusiasts' Club has arranged a steam-hauled special train to tour the whole of the remaining system of the Rotterdam Tramway Company on the afternoon of Saturday, October 7.

Other visits of tramway interest will also be made, including trips over two lines closing at the end of October.

Travel will be either by charter aircraft on the Saturday, or by sea, leaving London on the Friday evening and returning on the Sunday.

Non-members will be welcome to joint the tour, and those interested are invited to write for full details to F. L. Pugh, 60 Green Lane, New Malden, Surrey, enclosing an s.a.e.

COLNE VALLEY SPECIAL

On Sunday, October 8, enthusiasts will have an opportunity to travel on the Colne Valley line, which is to be closed to passenger services in the autumn.

On that day a special train, which Mr G. R. Lockie, of 36 Harold Road, Upper Norwood, London SE19, has organised for the Ramblers' Association, will run from Liverpool Street station via Saffron Walden to Halstead.

As far as Halstead the train will operate as a public excursion and tickets may be obtained in the usual way. But Mr Lockie has arranged to extend the journey privately to Marks Tey with ten-minute photographic stops at Earls Colne, White Colne and Chappel and Wakes Colne.

For this part of the trip tickets may be had only from Mr Lockie. The return fare for the additional private trip is 5s. 6d. (2s. 9d. for children under 14).

The train, hauled, I am sorry to say, by a diesel, will leave Liverpool Street, platform 13, at 9.33 (return fare to Halstead 13s. 6d.). Those who write to Mr Lockie for tickets or to enquire of fuller details are asked to enclose a stamped addressed envelope.

British Railways have promised that the diesel will be an 800 h.p. type not normally used for passenger work.

This may be your last opportunity to travel over the Haverhill-Yeldham section for immediately after closure this part of the track will be raised.

ILFORD SHOW

The enterprising Ilford and West Essex MRC are to hold an exhibition at Ilford Town Hall from October 25-27.

At least five operating layouts are planned—an extensive O gauge; an EM gauge railway, including a recently completed branch line; the club's OO gauge, which is always the centre of attraction on such occasions; and two TT layouts.

In addition there will be numerous items of railway interest and a display of static models.

Last year the exhibition was visited by 4,500 people and there is every expectation that the figure will be exceeded this year.

Doors are open from 3-9 p.m. on Thursday and Friday and from 10 a.m.-9 p.m. on Saturday.

Several model engineering societies and railway clubs have promised to attend.

CLUB DIARY

Dates must be sent at least four weeks before the event

September 9/10 City of Leeds SME. Club invitation day on Sunday.
September 9 Eltham and District Locomotive Society. Visit to North London SMEE at Arkley.
September 9 Bristol SMEE. Running day at Carford Park.
September 9 North London SME. Eltham and District Locomotive Society visit to Arkley.
September 9 Grimsby SMEE. Regatta at 2.15 p.m.
September 10 Birmingham SME. Invitation to the Leeds SME.
September 10 Norwich and District SME. Track meet at Eaton Park.
September 10 North London SMEE. SMEE visits Arkley.
September 10 MPBA. SR and RC regatta at Victoria Park.
September 10 Birmingham SME. Invitation to Leeds SME at Temple Newsam, Leeds.
September 12 City of Leeds SME. Track day at Temple Newsam.
September 13 Lincoln SMEE. AGM at the clubroom, Effingham Street, at 7 p.m.
September 14 Bristol SMEE. Meeting at the Mary Room of the YWCA.
September 15 Rochdale SMEE. General meeting at Lea Hall, Smith Street, Rochdale.
September 15 & 16 Crewe MES. Exhibition of models at the Corn Exchange, Crewe.
September 16 Bournemouth SME. Visit to Mr Perriers at 2.30 p.m.
September 16 Lincoln SMEE. Track day at Boulthon Park.
September 16/17 City of Leeds SME. Track meets at Temple Newsam.
September 17 MPBA. Hydroplane regatta at Duncombs Breeches, Woburn Abbey at 12.30 p.m.
September 17 York City MES. Track day at Bishopsthorpe.
September 17 YM 6m. OA. M class team race between YM 6m. OA and Hove and Brighton MYC at Rick Pond, Hampton Court at 10.30 a.m.
September 17 MPBA. RC regatta at Hove Lagoon.
September 17 Hitchin MES. Cambridge MES visit us today.
September 17 Cambridge MES. Visit to Hitchin MES track.
September 17 Maidstone MES. Track day at Mote Park.
September 19 City of Leeds SME. Talk on how to set out Walschaerts valvegear by Mr J. Hainsworth at the Salem Chapel.
September 20 Southampton MES. Meeting at 20 Carlton Crescent, Southampton, at 8 p.m.
September 20 Wimbledon MRC. A lecture by Mr A. M. Wells on the Midland and Great Northern Railway.
September 23/24 City of Leeds SME. Track meets at Temple Newsam.
September 23 Bournemouth SME. Visit to Burnerd Chucks Ltd at Alinchester, 10.30 a.m.
September 23 Wigan MES. Meeting at St. Michaels Institute, Swinley.
September 23 Bristol SMEE. Running day at Carford Park.
September 24 MPBA. SR regatta at the Round Pond.
September 24 YM 6m. OA. Metropolitan and S. District A class championship at Surbiton.
September 24 YM 6m. OA. Metropolitan and Southern District Championship for A class vessels at the Rick Pond, Hampton Court, at 10.30 a.m.
September 24 Norwich and District SME. Track meet at Eaton Park.
September 26 City of Leeds SME. Track meet at Temple Newsam.
September 30 City of Leeds SME. Track meeting at Temple Newsam.

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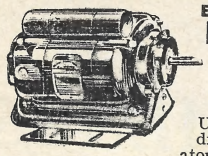

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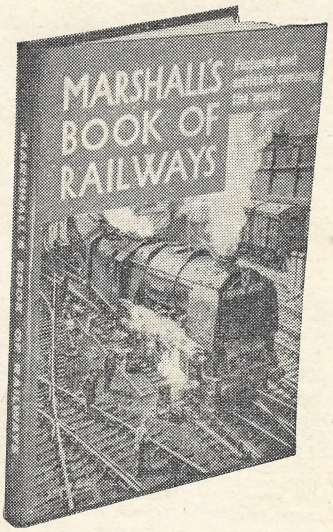

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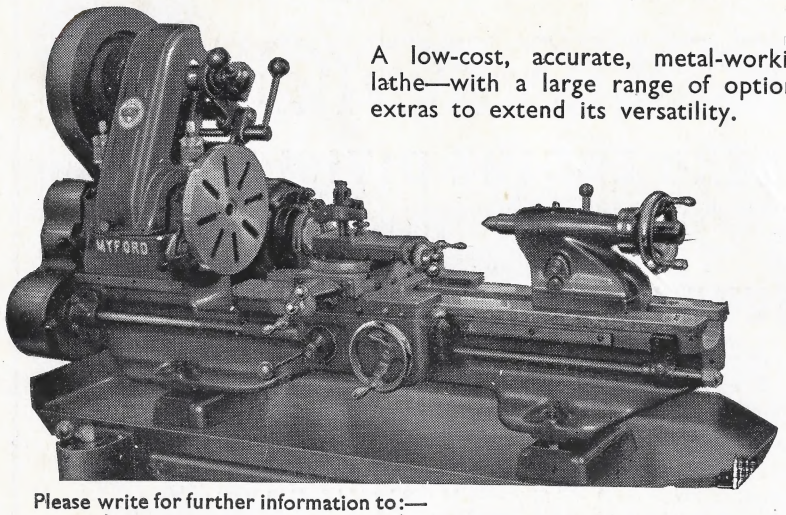

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